The Role of Anxiety over Land and Forest Fire in Influencing Residents' Coping Responses: An Empirical Study in Indonesia

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In Loving Memory of my beloved Papa

Raja Asri Yaman

Dearest Papa,
This thesis is specially dedicated for you
I hope you are proud of me
Thank you so much for your everlasting love
You made me to be the person I am today

Papa.. not a day goes by that I don't think about you
I miss you with every breath
You will be in my heart forever

Sharah sayang Papa

Lovingly dedicated to:
Papa, Raja Asri, and Mama, Asrayetti

ACKNOWLEDGEMENTS

I would like to extend my sincere appreciation for everyone that has supported me throughout this PhD journey. PhD is not an easy task, but with every one of you by my side, I finally reach the end of this journey.

First of all, I would like to express my gratitude to my supervisors Dr. Ahmad Daryanto and Professor Juliana Sutanto for giving me the opportunity to pursue my PhD under their supervisions. Thank you very much for your endless support, guidance and patience, without which, this thesis may never have concluded. Dr. Anto, your support and encouragement have been invaluable. You have been continuously encouraging and guiding me in the last three years, and also you have always been so friendly and supportive of all of my efforts and struggles. Your exceptional quantitative knowledge has shaped my research skills. You have taught me how to see things in a different perspective in both academic and real life. I have learned and grown a lot as a person and researcher. Prof. Juliana, your motivation, and immense knowledge have inspired me to be a better researcher. Your continued guidance helped me in all the time of research and writing this thesis. Your professional skills have aspired me to be the best in my field. You both are my inspiration. Working under your supervisions have been very enjoyable. Thank you for everything and believing in me.

I would like to acknowledge my deepest appreciation for Directorate General of Higher Education, Ministry of Education and Culture, Republic of Indonesia which supported me with a fully funded PhD scholarship and for giving me an opportunity to continue my PhD at Lancaster University.

I would also like to thank all the members of Department of Marketing at Lancaster University for the help and support.

Next, I would like to say thanks to my besties Ida Komang and Hesti Roro, who are scattered across the world. I am beyond grateful to have you both in my life. You are my best support system. Thank you for your endless love and support. Thank you for keeping me smiling.

Special thanks to family and friends that made me feel at home in Lancaster and for your years of kind support, encouragement and advice: Quynh, Jia, Jingxi, Sunanda. My special thank also goes to my sis Arwen for always cheering me on and taking care of me. Thank you all for the friendship.

Most importantly, to my beloved parents, for their love, support and encouragement, and for giving me so many of the opportunities that made this possible. Mama and papa – words are not enough, but I owe so much of this to you. My special thanks to my brother, Taufan, my sister, Olga, my sister-in-law, Dessy, my nephews and niece, Aran, Qia and Karim. Thank you all for the love.

Finally, my special gratitude goes to Ipo. Thank you for supporting me in every step of a way. Thank you for being there for me, whenever I need you.

Above all, all praise and thanks to Allah, the Most Gracious, the Most Merciful, who always gives me strength and blessings. Whom I seek protection.

My heart is full.

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CHAPTER 1

INTRODUCTION

In recent decades, land and forest fire disasters have increased intensely and resulted in numerous fatalities and caused loss of economic and infrastructural materials in many countries in the world. McGee and Russell (2003) indicated that half of the economic damage in Australia is triggered by land and forest fire. For example, in 2009, Australian land and forest fire reportedly burnt more than 2,000 houses and led to 173 fatalities (Penman et al., 2013). In addition, land and forest fires in California, USA in 2007 caused more than 2,000 houses to be destroyed and 300,000 residents evacuated (McCaffrey and Rhodes, 2009). In 2020, land and forest fire in the USA burnt more than 10 million acres of land, prompted around 40,000 residents to evacuate, and took 11 lives (Abatzoglou et al., 2021). Most recently, Taylor et al. (2022) indicated that the California land and forest fire in 2018 has caused economic disruption in the USA with an estimated loss of $148.5 billion. In European regions, land and forest fires in summer 2022 burned 600,371 acres of land across Europe including France, Italy and Spain (Abnett, 2022). The data are consistent with Busenberg's (2004) finding that land and forest fires are able to burn millions of acres of land and create serious environmental and social damage on an international level.

Past studies showed that land and forest fire has increased in the past few years for several key reasons (Abatzoglou et al., 2021; Reisen et al., 2015). First, extreme weather conditions as a result of global warming cause strong and dry winds that contribute to the spread and intensity of the fires. Second, bad policies in forest management practices have removed fire resistant trees and caused an increased rate of spread. Third, population density near land and forest fire prone areas increases the likelihood of fire spreading more quickly to inhabited areas. Fourth, high intensity of fires causes firefighters to extinguish the fire less effectively due to the

extreme weather conditions. These series of forest fire around the world have made tremendous threats to life, property, and the environment. Land and forest fire has taken away thousands of lives, triggered some physical and psychological problems, prompted air pollution, climate change, and deforestation (Flannigan et al., 2000; Fowler, 2003).

Furthermore, residents' response and behavior has been found to be influential in contributing to the massive impact of land and forest fire (McCaffrey and Rhodes, 2009). McLennan et al. (2006) found that some residents were reluctant to leave their houses during land and forest fire because they wanted to defend their property, while other residents waited to see how fast the fire moved before making a final decision on whether or not to evacuate. The following are two real life narratives of two victims of land and forest fire from *The LA Times* and *The Guardian*.

A story from *The LA Times*:

> Having r*efused to evacuate immediately from the land and forest fire, Jan and her husband were trapped on fire and spent six hours in their neighbor's pool. Luckily, they survived. They knew there were fires, but they thought the fires were still far away and they did not expect the fires to spread vastly, and they were late to evacuate. They both suffered from minor injuries (Abcarian, 2017).*

A story from *The Guardian*:

> *Iyer, a doctor, she suffered from Post Traumatic Stress Disorder after seeing the land and forest fires had snatched her house to the ground. Incapable of coping with emotional distress post the incident, she has been seeing a psychologist regularly since then to get some treatment and heal her emotional distress due to the post fire incident (Kuipers, 2019).*

The two narratives highlight residents' condition when they were late to evacuate, thereby making them suffer physically and emotionally as a result of the land and forest fire. Emotions are evidently one of the most important parts of disasters. It is clear that disasters have the ability to disturb emotional feelings (Morrice, 2013). One important emotional feeling in relation to land and forest fire is anxiety. Kolaitis et al. (2011) argue that anxiety for those who are exposed to the fire can pose emotional distress. Residents who live near forest fire prone areas may have prolonged anxiety as they have frequent exposure to land and forest fire.

Global crisis in terms of land and forest fire disaster is inevitable and may continue to arise in the future. However, the impacts can be controlled and may be reduced by implementing several strategies in order to lessen the impacts of land and forest fire. This thesis zooms in on the residents' anxiety over land and forest fire. We focused on the impact of anxiety over land and forest fire as an emotional factor affecting the residents' intention to consume environmentally friendly products and comply with warning messages as a coping response. The research context of this thesis is Indonesia. Through a specific focus on varying themes, this thesis pinpoints the role of anxiety over land and forest fire in influencing residents' coping responses and mitigating the impact of land and forest fire. The introduction will sketch the background against which the hypotheses that are presented and empirically tested in this thesis have been established. In the next section, we will elaborate the measurement of anxiety over land and forest fire used in this thesis. Then, we will briefly discuss the extant research regarding land and forest fire and residents' coping responses. Next, we will highlight in a more specific way land and forest fire in Indonesia. Finally, we will present the thesis objective, followed by the thesis outline.

Measurement of Anxiety over Land and Forest Fire

According to the American Psychiatric Association (2013), anxiety is an emotion characterized by an apprehensive anticipation of some future threat that results in feelings of unease and a sense that things are uncontrollable or unpredictable. It is also identified as "an aversive emotional state occurring in threatening situations" (Eysenck et al., 2007, p.336). There are two types of anxiety i.e., trait and state anxiety (Spielberger, 1983). Trait anxiety refers to a feeling of experiencing anxiety across multiple time points (Bishop, 2007). State anxiety, on the other hand, is described as an individual's current level of anxiety (Tang and Gibson, 2005). The experience of anxiety may come from the cognitive perception of an event as personally threatening, either physically or psychologically, which triggers the physiological changes. These changes can be referred to as anxiety symptoms, such as shakiness, trembling, racing heart, and sweating (Wall and Lee, 2022). Anxiety can be characterized by the combination of worried thoughts and anxiety symptoms. To illustrate, the worried thoughts are the worry about your health or worry about losing your loved ones because of an impending disaster. As a result, you may experience physical changes such as dizziness or rapid heartbeat because of unpleasant or stressful situations.

People are likely to develop anxiety while under stress (Mogg and Bradley, 1999). In particular, anxiety usually occurs when people are exposed to a potentially dangerous situation e.g., natural disasters (Lazarus, 1991). Indeed, anxiety has been studied in disasters e.g., earthquake, flood (Mishra and Suar, 2012; Nakayachi et al., 2015). Past studies have shown that disastrous events can create emotional distress and negative feelings on an individual's well-being (Kemp et al., 2014). Previous research also revealed that disasters are positively related to the development of anxiety among people who experience disasters (Wirtz et al., 2019). Land and forest fire is one of the disasters that can pose a serious threat to people, economy and environment. It triggers emotional distress i.e., anxiety among residents who live

near land and forest fire prone areas. Past studies mentioned that residents who are exposed to fire are likely worry about their health, property, land, loved ones (Kolaitis et al., 2011). However, research on disaster anxiety and forest fire only revolves around anxiety symptoms (Beck et al., 1988), general worried thoughts (Kolaitis et al., 2011), worry as an individual personality characteristic (Meyer et al., 1990) or worry as constructive and unconstructive worry (McNeill and Dunlop, 2016). Previous studies have not explored the specific worried thoughts about land and forest fire (McNeill et al., 2016).

In this research, we conduct a study on land and forest fire disaster. We specifically measure and develop a scale for the worried thoughts about land and forest fire. We map the worried thoughts about land and forest fire to anxiety over land and forest fire. Our study examines the residents' current level of anxiety over land and forest fire as it is a specific situation that can be affected by situational factors. Understanding residents' level of anxiety is important because it can help to evaluate residents' behavior, manage their stressful situations and mitigate the impact of land and forest fires disaster.

Extant Research on Land and Forest Fire and Residents' Coping Responses

Some research has explored the relationships between disaster and residents' coping responses (Mishra and Suar, 2012). Within the research on disaster, land and forest fire has emerged as a focal topic, as the size and the impact of such disasters have become more intense and frequent (Földi and Kuti, 2016). Previous research on land and forest fires revolves around the impact of land and forest fire (Flannigan et al., 2000; Kochi et al., 2010; Reisen et al., 2015), land and forest fire prevention (Kalabokidis et al., 2016; Prestemon et al., 2010), and risk management (Galiana-Martin et al., 2011; Vigna et al., 2021). The research topic also expands to residents' coping responses in land and forest fire incidents (McLennan et al., 2006). It is a challenging topic to explore as human behavior is complex, most specifically when it is related to land and

forest fire disaster. Previous research includes residents' intention to resolve the stressful events into coping strategies to reduce the impact of land and forest fire disaster i.e., environmentally friendly products purchase (Gassler and Spiller, 2018; Ostfeld et al., 2019), and compliance with warning messages (Kuligowski, 2021; McCaffrey and Rhodes, 2009).

Land and Forest Fire and Environmentally Friendly Products Purchase

Environmentally responsible behavior is getting more attention in the literature which leads many consumers to buy environmentally friendly products (Peloza et al., 2013). This also includes purchasing products with certification labels such as RSPO certification. RSPO is Roundtable Sustainable Palm Oil certification to reduce the impacts of land and forest fire (Degli Innocenti and Oosterveer, 2020). It aims to "promote the growth and use of sustainable palm oil" (Laurance et al., 2010, p.377). The general mission of RSPO certification is to forbid the use of fire in preparing new land in order to lessen the negative impacts of forest fire and deforestation (RSPO, 2004). However, after the implementation of RSPO, some studies delivered different results. Previous studies mentioned that consumers are willing to purchase certified palm oil products (Ostfeld et al., 2019) whereas other research showed that consumers are reluctant to consume certified palm oil products (Hinkes and Christoph-Schulz, 2019). Past research even found that consumers do not want to buy products related to palm oil, as they consider the palm oil has some detrimental effects on the environment, let alone that it is one of the primary causes of forest fire which can result in emotional distress for residents who live near the forest fire areas (Hartmann et al., 2018; Sundaraja et al., 2021a). Another factor that contributes to the consumers' intention to buy certified palm oil products is the willingness to pay. Past studies showed that consumers are unwilling to pay at a higher price for RSPO products because of their limited budget, while others are willing to pay higher prices for RSPO products (Gassler and Spiller, 2018; Hinkes and Christoph-Schulz, 2019).

Land and Forest Fire and Compliance with Warning Messages

Research on land and forest fire also spans across other disciplines such as compliance studies. As the frequency and impact of disasters have increased intensely, life-threatening disasters such as the Indian ocean Tsunami, Hurricane Katrina, Australian wildfires, Japanese earthquakes have made governments deploy an early warning message system to reduce the impact of disasters (Chatfield et al., 2013). The warning message aims "to inform people about potential hazards in the environment and to persuade them to engage in behaviors that allow them to avoid injury or property damage" (Wogalter et al., 1999, p.185-186). The warning message aims to mitigate the impact of disasters. It is essential that residents understand the risks conveyed by the warnings and respond accordingly. Warning messages are essentially used to communicate with the residents about impending disasters so that they are vigilant about the current disaster situation. Such messages may enable residents to prepare further steps and make decisions in the face of danger (Yoo et al., 2021).

Research has revealed that warning messages affect residents' compliance intention. However, previous studies on warning message compliance are inconclusive. Some studies found that residents often ignored public warnings (Dow and Cutter, 2000; Rahn et al., 2021) while other studies demonstrated that residents would comply with the warning message (Fischer et al., 2019; Han et al., 2015; Yoo et al., 2021). In a land and forest fire disaster, the way residents respond to warning messages might be different. Residents' compliance with the warning messages hinges on the potential damage of the fire and how fast the fire is moving toward residents' houses (McCaffrey and Rhodes, 2009). Some residents may comply with the warning messages and some others are reluctant. Sociodemographic indicators such as individual characteristics and cultural differences are among the factors that influence residents' compliance with warning messages (Mozumder et al., 2008). Past research showed

that residents who experience land and forest fire disasters are unwilling to leave their houses, defend their land and they will wait until they think that the fire threat is widespread and then make some compliance decisions (McLennan et al., 2019). Other research demonstrated that residents intend to evacuate if they receive warning from the local authorities (McCaffrey and Rhodes, 2009).

Thesis Focus

Despite the interesting findings of past research on land and forest fire and residents' intentions with regard to coping responses as explained in previous sections, there are some limitations in their studies. Previous studies neglect emotional factors in explaining residents' behavior. Schwarz (1990) revealed that an emotion may be one of the factors that influences residents' judgments and decisions. Past research has studied how emotion affects behavior and what motivates consumers to regulate their emotional states (Williams, 2014). Previous research also has distinguished both types of emotion (positive and negative) and examined their impacts on consumer behavior and consumption (Raghunathan et al., 2006). Anxiety is one of the negative emotions which can directly or indirectly influence residents' behavior (Zheng et al., 2020). Anxiety can lead to strong behavioral changes if consumers experience a dramatic situation such as a natural disaster (Di Crosta et al., 2021). The emotional effect may vary in relation to the behavior and characteristics of particular forest fires (Fowler, 2003). An insightful example is the research of Kolaitis et al. (2011) on land and forest fire disaster. The findings revealed that when residents have frequent exposure to land and forest fire, they are likely to worry or be anxious about their health, property, land, and loved ones. This anxiety will influence their behavior. Despite creating negative effects for residents' mental conditions, anxiety may also create a positive impact on residents' behavior (Kemp et al., 2021). In this sense, anxiety over land and forest fire may lead residents to undertake responsible behaviors e.g., purchase

environmentally friendly products (Gao et al., 2021; Wang and Wu, 2016) or perform precautionary behaviors e.g., compliance with warning messages (Jin et al., 2016).

Therefore, this thesis revolves around the role of an emotional factor i.e., anxiety over land and forest fire in influencing residents' coping responses. We address the gaps in previous studies on land and forest fire and residents' coping responses by taking into consideration an emotional factor for residents who live near land and forest fire prone areas in our three chapters. From the theoretical point of view, studying anxiety in this thesis is important for a number of reasons. First, anxiety is a key to our understanding of the underpinnings of the changes in residents' behavior, particularly in the unprecedented context i.e., land and forest fire disaster. Second, anxiety offers a new perspective in explaining underlying mechanisms influencing behaviors. For example, anxiety has been proposed to be a moderator variable in explaining consumer willingness in AI (Yuan et al., 2022), and a mediator variable in analyzing online compulsive buying (Zheng et al., 2020). With regard to land and forest fire disaster situations, understanding consumers' level of anxiety in a land and forest fire helps government or decision makers in designing strategies to mitigate the impact of land and forest fire. For instance, marketers and the government should harness residents' anxiety for sustainable palm oil consumption, which indirectly may affect palm oil companies and prompt them to pursue sustainable production. Besides that, it can also help the government in formulating an effective early warning message for residents in the event of land and forest fire.

Indonesia as the Empirical Context

Land and forest fire is a familiar sight for many Indonesian regions, particularly in Sumatra and Kalimantan islands of Indonesia. It is a major issue in Indonesia because of the frequency of occurrence. The total forest area burned from a period of 2015-2022 is almost six million ha (SiPongi, 2022), and this series of fires has caused negative impacts on environmental,

economic, health, and social dimensions (Edwards et al., 2020). These episodes of fire in Indonesia also have made Indonesia one of the biggest contributors to environmental destruction (Carlson et al., 2018). One of the most fatal episodes of land and forest fire in Indonesia happened in 1997-1998. The fire burned eight million acres of forest areas, causing severe pollution across Indonesia. It even spread into its neighboring countries e.g., Malaysia, Thailand, Singapore. It went even further to Australia (Sastry, 2002). These 1997-1998 fires also caused fatalities with early mortality costs of over $15 billion (Edwards et al., 2020). Past research mentioned that Indonesia has lost 25% of its tropical rainforest (Sheldon and Sankaran, 2017). In 2015 alone, the Indonesian fire burned 2.6 million acres of land (Edwards et al., 2020) which made it one of the worst forest fires on record. As a result of this 2015 fire, the Indonesian economy lost $16.1 million (Krah, 2020).

Apart from extreme dry seasons, human causes have been credited for the extreme land and forest fires in Indonesia (Harrison et al., 2009). Farmers intentionally burn the forests to clear the land with the slash-and-burn technique to start a new palm oil plantation. The massive expansion of palm oil plantation in Indonesia has been translated into the alteration of land use and intrusion of environment i.e., deforestation which worsens the global warming impacts (Degli Innocenti and Oosterveer, 2020). The fire incidents, unfortunately, have created serious environmental and socioeconomic disruptions (Gatti et al., 2019). The thick haze from fire in the atmosphere has forced some businesses, schools, and offices to shut down (Edwards et al., 2020). It also triggers emotional distress i.e., anxiety among residents who live near the land and forest fire prone areas (Kolaitis et al., 2011). Research has shown that people are likely to develop anxiety while being under stress (Mogg and Bradley, 1999). In particular, anxiety usually occurs when people are exposed in a potentially dangerous situation e.g., natural disasters (Lazarus, 1991). Past studies have shown that disastrous events can create emotional distress and negative feelings, affecting an individual's wellbeing (Kemp et al., 2014). Previous

research has also revealed that disasters are positively related to the development of anxiety among people who experience them (Wirtz et al., 2019).

In this thesis, we specifically conduct a study on land and forest fire disasters in the Indonesian context. We specifically measure anxiety over land and forest fire by including residents who live near the land and forest fire prone areas in Indonesia in our study. The thesis examines the residents' level of anxiety over land and forest fire and their coping responses to mitigate land and forest fire.

Research Objectives

The aim of this thesis is to examine the role of anxiety over land and forest fire on residents' coping responses. As anxiety is perceived as an emotion which can influence people's behavior and decisions (Lerner et al., 2015), particularly, in this thesis we study the impact and the role of anxiety over land and forest fire as an emotional factor in affecting residents' intention to consume environmentally friendly products and comply with warning messages as a coping response. Therefore, this thesis is bounded by the following objectives:

- To develop and validate a scale for anxiety over land and forest fire.
- To examine the relationship between anxiety over land and forest fire, environmental knowledge and purchase intention toward certified palm oil products.
- To empirically test the relationship between normative vertical power and perceived source credibility on message compliance intention and how anxiety over land and forest fire affects that relationship.

Research methodology

This section presents the methodological foundation for the thesis. The aim of this section is to justify and outline the methodology used in each chapter to empirically validate the proposed

theoretical framework. The research methodology enables researchers to understand the substantive and conceptual domains and to investigate the research objectives (Brown and Dant, 2008). This section begins by outlining several research methodologies underpinning each chapter. We conduct several different research methodologies in our chapters. In Chapter 2, qualitative and quantitative approaches are used to develop and validate a scale development of anxiety over land and forest fire. In Chapter 3, a quantitative approach is used to test the proposed theoretical framework for purchase intention toward certified palm oil products. In Chapter 4, a quantitative approach is also employed to assess the proposed theoretical framework of warning message compliance. In the next sections, we will outline the research design, data collection and data analysis techniques of each chapter.

Research design

In Chapter 2, we develop and validate a scale for anxiety over land and forest fire. This chapter consists of three studies. Each study has different research design. In study 1a, we employ a qualitative study which includes literature review and focus group discussion. We develop some definition concepts based on literature reviews then employ focus group discussions to give a clear glimpse of the definitions, and conduct interview with experts. The first thing that is necessary to clarify is to analyse how the focal construct has been developed in previous studies. The aim in construct development is to recognize prior usages of the term descriptions, strictly related constructs. MacKenzie et al. (2011) highlight that it is pivotal to have a theoretical concept of a construct, which entails the set of central attributes that are required and satisfactory for something to be an example of the construct. Thus, in this research the conceptual definition of disaster anxiety must be specific. Then, it is followed by a focus group, as Churchill (1979) mentions, focus groups could be appropriate in order to have some benefits at developing concepts and item generations. In study 1b, we conduct exploratory

factor analysis (EFA) to generate items for the scale for anxiety over land and forest fire. EFA is mostly used and applied to identify the number of factors influencing variables and to reveal the latent structure that underlines them (Fabrigar et al., 1999). In study 2a, we aim to further analyse the multidimensionality of anxiety over land and forest fire by employing confirmatory factor analysis (CFA). The purpose of conducting CFA is to confirm whether the number of dimensions can be proven empirically (Churchill, 1979). In study 2b, the construct validity is employed. The CFA results in study 1b will be confirmed through construct validity. It aims to analyze the generalizability of the constructs in other populations (Gerbing and Anderson, 1988). In study 3, we employ a nomological network. This aims to examine whether the indicators of the focal constructs relate to measures of other constructs. Thus, it is important to test the nomological network by combining additional constructs particularly to evaluate the multidimensional structure of the focal constructs (MacKenzie et al., 2011).

In Chapter 3, we examine the influence of anxiety over land and forest fire, and environmental knowledge on certified palm oil products. We also examine the mediating effect of attitude towards certified palm oil products to explain the relationship between anxiety over land and forest fire, environmental knowledge and purchase intention towards certified palm oil products. We develop a conceptual model in this chapter to analyze the relationship for all the latent constructs. There are four hypotheses derived from the conceptual model. Hypotheses 1 and 2 are to test the relationship between anxiety over land and forest fire and environmental knowledge on purchase intention towards certified palm oil products. To test the hypotheses, we employ CFA to assess the reliability and validity of our constructs by treating anxiety over land and forest fires as a second-order factor. After we achieve an acceptable fit indices of the model, we test the structural relationships between independent and dependent variables using SEM. We also analyze the discriminant and convergent validity to measure reliability and internal consistency of the measured variables representing a latent construct (Hair et al., 2017).

Then we test hypotheses 3 and 4 to test the mediating effect of attitude towards certified palm oil products by employing CFA and SEM. We also test the discriminant and convergent validity for the latent constructs.

In Chapter 4, we measure the relationship between government's normative vertical power, perceived source credibility and warning message compliance intention. We also test the moderating effect of anxiety over land and forest fire in explaining the relationship between normative vertical power and perceived source credibility on message compliance intention. We develop a conceptual model to analyze each relationship between independent and dependent variables. In order to measure the proposed conceptual model, we derive four hypotheses. Hypotheses 1 and 2 are to seek the influence of perceived subjective norm and perceived source credibility on message compliance intention. Hypotheses 3 and 4 are to test the interaction effect of anxiety over land and forest fire on the relationship between perceived subjective norm and message compliance intention, and perceived source credibility and message compliance intention. To test the hypotheses, first we conduct CFA to measure the psychometric properties of each construct. Then, we test the convergent validity for each construct by assessing average variance extracted (Fornell and Larcker, 1981). We examined the discriminant validity of each construct by measuring the square root of the AVE (Fornell and Larcker, 1981). Furthermore, we use a hierarchical regression to test our main and moderation hypotheses and lastly we test the potential quadratic effects that might lead to spurious moderation (Daryanto, 2019).

Data Collection and Data Analysis Technique

The data collection in this thesis is in Indonesia, particularly we target the residents who live near the land and forest fire prone provinces in Sumatra and Kalimantan islands of in Indonesia.

Chapter 2 involves scale development of anxiety over land and forest fire which follows Churchill's (1979) procedures. It adopts both qualitative and quantitative elements. Study 1a is a qualitative approach which consists of literature review, focus group discussion and expert discussion. The literature review includes collecting and analyzing relevant literature to generate items for anxiety over land and forest fire. The focus group discussion involves a discussion with 10 participants. Then, after generating items from the literature review and focus group discussion, we conduct face validity with two senior academics to discuss the items. For study 1b to study 3 we use a quantitative approach. We design an online survey and apply a translation and back translation procedure. The online survey is distributed in provinces in Sumatra and Kalimantan islands. For study 1b, we have 495 participants. We conduct EFA with principal axis factoring and direct oblimin rotation in SPSS version 27. In study 2a, we have 252 samples, and we employ CFA with maximum likelihood using AMOS. In study 2b, we employ construct validity by testing 254 samples using AMOS to test the CFA. For the nomological network (study 3a), we use SEM to test the relationship between latent constructs using R lavaan.

Chapter 3 uses a quantitative approach. We have two different sets of samples in this chapter. The first set of samples is 502 participants. We send our online survey to our target respondents in several provinces in Sumatra (i.e., Jambi, Riau, and South Sumatera) and Kalimantan (i.e., South Kalimantan, West Kalimantan, North Kalimantan, East Kalimantan and Central Kalimantan). To assess the reliability and validity of our constructs we employ CFA using R lavaan. To test our hypotheses 1 and 2, we conduct regression analysis using the R package lavaan. Moreover, to test hypothesis 3 and 4, the data collection is similar to the previous one. We have 527 valid responses. We test the mediating variable of attitude towards certified palm oil products using R package lavaan. We also test our hypotheses by examining

the significance of the path coefficients and their bootstrap confidence intervals. We execute 5000 bootstrap samples to measure the significance of the relationships.

Chapter 4 also utilizes a quantitative approach. We employ an online survey and distribute the survey to participants in several provinces in Sumatra (i.e., Jambi, Riau, and South Sumatra) and Kalimantan (i.e., South Kalimantan, West Kalimantan, North Kalimantan, East Kalimantan and Central Kalimantan). There are 651 participants in total to be included in the analysis. We conduct CFA to test the psychometric properties of each construct using the R package lavaan. Then we test main and moderation hypotheses using R lavaan. Finally, we also test the spurious moderation using ModlR developed by Ahmad. This test aims to seek the potential quadratic effects that might lead to spurious moderation (Daryanto, 2019). A research methodology overview of each chapter and their data collection and techniques are presented in Table 1.

Table 1. Overview of data analysis and data collection method

Chapter	Research design	Variables			Data collection method	Data analysis	Software	Sample size
		Independent	Dependent	Mediator/ Moderator				
Chapter 2	Study 1a	N/A	N/A	N/A	Literature review	Literature review	N/A	N/A
					Online focus group discussion	Content analysis	N/A	10
					Expert discussion	Face validity	N/A	2
	Study 1b	N/A	N/A	N/A	Online survey	EFA	SPSS	495
	Study 2a	N/A	N/A	N/A	Online survey	CFA	AMOS	252
	Study 2b	N/A	N/A	N/A	Online survey	CFA for construct validity	AMOS	254
	Study 3a	1. Trait anxiety 2. Anxiety over land and forest fire	Information seeking channels	N/A	Nomological network	CFA and SEM	R lavaan	370
Chapter 3	Hypothesis 1	1. Anxiety over land forest fire, 2.Environmental knowledge	Purchase intention towards certified palm oil products	N/A	Online survey	CFA and SEM	R lavaan	502
	Hypothesis 2	1. Anxiety over land forest fire, 2.Environmental knowledge	Purchase intention towards certified palm oil products	N/A	Online Survey	CFA and SEM	R lavaan	502
	Hypothesis 3	Anxiety over land forest fire,	Purchase intention towards certified palm oil products	Attitude towards certified palm oil products	Online Survey	CFA and SEM	R lavaan	527
	Hypothesis 4	Environmental knowledge	Purchase intention towards certified palm oil products	Attitude towards certified palm oil products	Online Survey	CFA and SEM	R lavaan	527
Chapter 4	Hypothesis 1	1. Perceived subjective norm 2. Perceived source credibility	Warning message compliance intention	N/A	Online survey	CFA and SEM	R lavaan	651

Chapter	Research design	Variables			Data collection method	Data analysis	Software	Sample size
	Hypothesis 2	1. Perceived subjective norm 2. Perceived source credibility	Warning message compliance intention	-	Online survey	CFA and SEM	R lavaan	651
	Hypothesis 3	Perceived subjective norm	Warning message compliance intention	Anxiety over land and forest fire	Online survey	CFA and SEM for interaction effect	SPSS and R lavaan	651
	Hypothesis 4	Perceived source credibility	Warning message compliance intention	Anxiety over land and forest fire	Online survey	CFA and SEM for interaction effect	SPSS and R lavaan	651
	Spurious test	1. Perceived subjective norm 2. Perceived source credibility	Warning message compliance intention	Anxiety over land and forest fire	N/A	Quadratic terms	ModlR	651

Thesis Outline

We present three different independent chapters: first, a scale development for anxiety over land and forest fire as presented in Chapter 2; second, an empirical study examining the relationship between anxiety over land and forest fire and purchase intention towards certified palm oil products as reported in Chapter 3; third, an empirical study focusing on the relationship between normative vertical power, perceived source credibility and warning message compliance in the context of land and forest fire in Chapter 4 (see the detail in Table 2). These three studies are independent but interrelated to address the research questions. The following paragraphs will briefly discuss the main topics of the three studies.

Chapter 2 develops and validates a scale for anxiety over land and forest fire. It provides a systematic scale development procedure. We conduct multiple studies in Chapter 2. Study 1 includes literature review, focus group discussion, face validity and EFA to generate items for the scale for anxiety over land and forest fire. Study 2a tests the factorial structure of the items generated from study 1, study 2b checks the construct validity of the scale using confirmatory factor analysis (CFA). Study 3a reviews the nomological network to test the generalizability of the scale using trait anxiety as the antecedent and information seeking as the outcome. Study 3b also examines measurement invariance. It aims to check whether there are significant differences between samples.

Chapter 3 outlines an empirical study focusing on the relationship between anxiety over land and forest fire, environmental knowledge and purchase intention towards certified palm oil products. We investigate the influence of anxiety over land and forest fire, and environmental knowledge on certified palm oil products. Using a different sample size, we examine the mediating effect of attitude towards certified palm oil products to explain the relationship between anxiety over land and forest fire, environmental knowledge and purchase

intention towards certified palm oil products. The research context of this study is land and forest fire and certified palm oil.

Chapter 4 provides an empirical study exploring the relationship between normative vertical power, perceived source credibility and message compliance intention in the context of land and forest fire. This study also measures the moderating effect of anxiety over land and forest fire in explaining the relationship between normative vertical power and perceived source credibility on message compliance intention.

Chapter 5 highlights the summary and significance of the main findings about the role of anxiety over land and forest fire in affecting purchase intention towards certified palm oil products and message compliance intention. This chapter examines the practical implications and directions for further research.

Table 2: Overview of the three studies

	Conceptual Focus	Research Objective	Research Context	Methodology	Analysis
Chapter 2	- Scale development of anxiety over land and forest fire	To develop and validate a scale for anxiety over land and forest fire	Land and forest fire in Indonesia	Focus group discussions and quantitative survey	Exploratory Factor Analysis (EFA) using SPSS, Confirmatory Factor Analysis (CFA), Structural Equation Modelling (SEM) using AMOS
Chapter 3	- Relationship between anxiety over land and forest fire, environmental knowledge and certified palm oil products - The mediation effect of attitude towards certified palm oil products on the relationship	To investigate the influence of anxiety over land and forest fire, and environmental knowledge on purchase intention towards certified palm oil products	Land and forest fire and certified palm oil products in Indonesia	Quantitative survey	Structural Equation Modelling (SEM) using R
Chapter 4	- The relationship between normative vertical power, perceived source credibility on message compliance - The moderation effect of anxiety over land and forest fire	To analyze the relationship between normative vertical power, perceived source credibility and message compliance intention and how anxiety over land and forest fire affects that relationship	Land and forest fire in Indonesia	Quantitative survey	Structural Equation Modelling (SEM) using R

CHAPTER 2

Developing and Validating a Scale for Anxiety over Land and Forest Fire

Abstract

Land and forest fire continues to be one of the most anticipated natural or man-made disasters. Previous research has shown that the potential occurrence of disasters can trigger feelings of anxiety for individuals that might be affected by them. While existing scales for measuring feelings of anxiety toward land and forest fires examine the frequency and intensity of the feelings and anxiety symptoms, a scale that measures worried thoughts related to land and forest fire is not yet available. Measuring worried thoughts is central in understanding the contents of the anxiety for mitigating the emotional impact of disasters. Through a systematic scale development procedure, we develop a two-dimensional scale of anxiety over land and forest fire. We demonstrate the nomological validity of the scale by testing its relationship with trait anxiety and information channel seeking behaviors.

Keywords: anxiety; scale development; land and forest fire

1 Introduction

Land and forest fire is one of the most life-threatening man-made or natural disasters. It constitutes serious impact to economy, environment, and social community (Çolak and Sunar, 2020). Like any other disasters (e.g., earthquakes, flood, landslide), it can also trigger feelings of anxiety for residents who might be impacted by the land and forest fire (Kemp et al., 2014). Anxiety is an emotional reaction in response to the disaster events (Eysenck, 2013). The feelings of anxiety can last even after the disaster events have ended. For residents who live in disaster-prone areas, the constant threats of potential disaster occurring in their area might trigger anxiety even when the disaster is not presently occurring (Cook and Bickman, 1990; Groome and Soureti, 2004; North et al., 1989). Consequently, the feelings of anxiety can affect residents' disaster preparedness, namely, the extent to which they are ready to face the negative consequences of the plausible disasters (Fredrickson et al., 2003) such as displacement (Wirtz et al., 2019). Such disaster preparedness can increase residents' alertness of the potential occurrence of the disaster leading to reduction in the risk of serious injury and loss of life during disasters (Malkina-Pykh and Pykh, 2013). The loss of life due to forest fire is exacerbated by even the slightest hesitation when deciding whether to evacuate. In a 2016's forest fire in California, some residents stayed as the fire approached even closer simply because nobody wanted to be displaced until they had to (Sahagun et al., 2016), which means they are not ready to face the displacement consequence of forest fire. This situation is prevalent in other land and forest fire disasters. Identifying anxiety is crucial as it enhances people's ability to make decisions about stressful situations and reduces the disaster risks (Morrissey and Reser, 2003).

According to the American Psychiatric Association (2013), anxiety is an emotion characterized by an apprehensive anticipation of some future threat that results in feelings of unease and a sense that things are uncontrollable or unpredictable. Anxiety can also be defined as "a mental state that can be characterized by an intense sense of worry " (Güzel, 2022, p.175).

Our review of the literature on anxiety revealed three distinct approaches in conceptualizing or operationalizing the anxiety. The first approach operationalizes anxiety as the frequency and intensity of the feelings. An example of the approach is the State-Trait Anxiety Inventory, which contains items that measure feeling nervous, worried, calm, secure, content, etc. (Spielberger, 1983). The second approach operationalizes anxiety as worried thoughts. For example, the Anxious Thoughts Inventory (Wells, 1995) measures three dimensions of worried thoughts that includes social worry, health worry, and meta-worry. Social and health worry are content measures such as worry about appearance and thoughts about becoming seriously ill. Meta-worry is a meta-cognitive appraisal about worry such as unpleasant thoughts against one's will and missing out on things in life because of worrying too much (Barahmand, 2009; Wells, 1995). The third approach operationalizes anxiety as the physical changes of being anxious. An example of scale that uses this operationalization is the Beck Anxiety Inventory, which measures symptoms related to anxiety such as numbness, feeling hot, wobbliness in legs, etc. (Beck et al., 1988).

The limitation of the above approaches is that the first and third approaches do not provide information about the source of the feelings of anxiety (e.g., what an individual is worried about). The second approach provides such information; however, the approach taps an individual's worried thoughts in a specific psychological condition (e.g., worried thoughts that are manifested from generalized anxiety disorders). A few studies have attempted to measure worried thoughts of the residents in areas that are prone to land and/or forest fire (e.g., (Eisenman et al., 2015; Kolaitis et al., 2011). However, these studies have methodological limitation. That is, the development of the scale did not follow a rigorous procedure, e.g., using a specific sample and adapting scales from previous studies mixing with items developed from the literature that may not be about the land and/or forest fire. For example, Kolaitis et al. (2011) asked youths who lived in an area affected by fire in Greece questions about housing

adversity, separation from parents post-fire, property loss, worry for a loved one during fire, injury of a loved one and life-threatening experience of a loved one during fire. While providing valuable insights on such worried thoughts, a major limitation of their study is that the survey items were designed exclusively to tap the thoughts of this age group. Moreover, in the development of their scale, the item generation is based on the literature and does not include testing the generated items using the youth residents in the affected area, therefore the construct validity of the scale is limited.

Our explanation above suggests that anxiety is related to worried thoughts. Extant research has shown that individuals vary in their tendency to worry (i.e., trait worry). There are three widely used measures of worry as an individual personality characteristic in the literature. The first measure is the Penn State Worry Questionnaire (i.e., PSWQ, Meyer et al. (1990)) that contain items to measure worry as a general trait (e.g., "I worry all the time"). The second measure is the Worry Domains Questionnaire (i.e., WDQ, Stöber and Joormann (2001)) that tap an individual's amount of worry in relation to everyday's concerns such as relationship, lack of confidence, aimless future, work, and financial issues (e.g., "I worry that I will lose close friends"). The third measure is the recent Constructive and Unconstructive Worry Questionnaire (i.e., CUWQ, McNeill and Dunlop (2016)). This scale distinguishes worry as thought contents into two types, i.e., constructive, and unconstructive. The constructive worry assesses an individual attempt to reduce threats that causes the worry (e.g., "When I worry, I tend to think about ways to reduce my worry"). The unconstructive worry assesses an individual's "…tendency to worry in a manner that sustains threat awareness and feelings of anxiety (McNeill and Dunlop (2016, p.1374)) (e.g., "When I worry, I tend to ask myself, "Why can't I handle things better?"). Despite that the trait worry can be assessed by one of these measures and might be positively related to anxiety (see McNeill and Dunlop (2016)), the items

in those scale do not capture individual's differences in relation to anxiety over land and forest fire. Our aim is to fill this void in the literature.

In this paper, we theoretically developed and empirically validated a new scale to measure anxiety over land and forest fire that captures the multidimensional nature of anxiety over land and forest fire. This way, we provide a much-needed operationalization of anxiety over land and forest fire whereby our measures tap on an individual's worried thoughts related to land and forest fire. In doing so, we involve residents in disaster prone areas in the validation stage of our scale development procedure. We have two main objectives: (1) to develop and validate the reliability and validity of the dimensions of the anxiety over land and forest fire and their corresponding measurement items; and (2) to examine a nomological network that depicts the relationship between our scale and its antecedents and outcomes.

In the next section, we position our study in the extant anxiety literature. We then present three studies where we develop and validate our proposed measurement for anxiety over land and forest fire, following which we discuss the conclusions and implications of our findings.

2 Literature review

2.1 Anxiety

Psychologists argue that anxiety can be the result of anxiety provoking situations (Harrigan et al., 2004; Spielberger, 1970) which are mental simulations of how things could go wrong (Sanna and Meier, 2000), thoughts about the prospect of disappointment (Harrigan et al., 2004; Shepperd et al., 1996), or the aftermath of catastrophic events such as wars and disasters (La Greca et al., 2002; Masten and Narayan, 2012; Norris et al., 2002) including environmental disaster.

An environmental disaster is a catastrophic event that negatively affects the environment and is mostly caused by human activity.[1,2] One of the most worrying thoughts about environmental disasters is climate change (Beattie, 2003) due to air pollution (Edwards et al., 2020), deforestation (Tran and Shaw, 2007), and other human activities. There are many adverse impacts of environment degradation, such as the loss of natural vegetation and habitat that drive endangered species of plants and animals to extinction (Aalst and Burton, 2002), deterioration of local economy (Heger et al., 2008; Rasmussen, 2006), paralyzed tourism sectors, the surge in short-term health care needs (Barber and Schweithelm, 2000; Tacconi, 2003), and the long-term health effects (Farber, 1967; Sneath et al., 2009). Studies analyzing the health impact of forest fire on human health show that the high levels of smoke particles cause respiratory problems, pneumonia, heart disease, eye and skin disorders, asthma, and other serious long-term health conditions that can lead to premature death (Aiken, 2004; Rittmaster et al., 2006). The worried thoughts about these adverse impacts of environmental disaster are apparent even when the disaster is not presently occurring (Cook and Bickman, 1990; Groome and Soureti, 2004; North et al., 1989).

A previous study found that anxiety is also significantly related to the proximity to the disaster, which is known as the exposure effect (Groome and Soureti, 2004). The impact of forest fire on the destruction of natural vegetation especially affects people in rural areas who are living near the forest, and depend on agriculture and natural resources for their livelihood (Shaw, 2006; Tran and Shaw, 2007). While natural vegetation is quite resilient to other disasters (Aalst and Burton, 2002), it is very vulnerable to land and forest fire disaster. Poverty and vulnerability to disasters are integrally linked and mutually reinforcing (Wisner et al., 2004) which can trigger long lasting economic problems. Forest fire can cause work and school

[1] http://www.earthtimes.org/encyclopaedia/environmental-issues/environmental-disasters/
[2] Sometimes a natural disaster can become an environmental disaster

closures on and near the affected areas (Edwards et al., 2020), result in loss of property (Penman et al., 2013) and instigate anxiety symptoms among the residents (Bonanno et al., 2010). To this extent, researchers (Groome and Soureti, 2004; Lonigan et al., 1991; Tang et al., 2018) examining disaster anxiety tend to measure anxiety symptoms but not worried thoughts. In the following section, we discuss the theoretical distinctions between anxiety symptoms and worried thoughts which is the focus of our study.

2.2 Distinction between anxiety symptoms and worried thoughts about environmental disaster

Anxiety may occur as uncomfortable and worry feelings when people subjectively think that some threats may happen (Xi, 2020). Anxiety is generally associated with the feeling of tension, worried thoughts, and physical changes such as a rapid heartbeat (Wall and Lee, 2022). In the definition, the physical changes of being anxious are referred to as anxiety symptoms. Both worried thoughts and anxiety symptoms are manifestations of anxiety. The distinction between anxiety symptoms and worried thoughts of environmental disaster can be illustrated as follows. The worry about the loss of property, worry about the loss and injury of the loved ones (Kolaitis et al., 2011) are among the worried thoughts of environmental disaster, which are the content of the anxiety and may be different across different kinds of environmental disaster. Anxiety symptoms, such as an increase in blood pressure, sweating, trembling, dizziness and rapid heartbeat (Beck et al., 1988), are the observed physical changes of being anxious that are similar across various anxiety provoking situations including environmental disaster. Whereas the measurements of anxiety symptoms are well-established (see for example Beck et al. (1988)), the measurements of worried thoughts are not as established. This could be because the universality of anxiety symptoms is clearly understood as heightened automatic

nervous system activity; in contrast, worried thoughts or content of anxiety may vary across disastrous events.

Identifying anxiety that is manifested in worried thoughts is crucial as it enhances people's ability to evaluate stressful situations and reduces the disaster risks (Morrissey and Reser, 2003). To date, there has not been much attempt to measure the worried thoughts about land and forest fire despite their importance in disaster management (Fredrickson et al., 2003). In this paper, we refer to the worried thoughts of the land and forest fire as anxiety over land and forest fire. Among the few studies that measure the anxiety over land and forest fire (Eisenman et al., 2015; Kolaitis et al., 2011), none of them actively involved the residents when designing the survey items. Without the residents' active involvements throughout the development of the measurement of anxiety over land and forest fire, the scale may not represent the residents' worried thoughts. Since it is a situational content of anxiety, the measurements have to be tailored to the specific situation. Land and forest fire have different effects on different communities (Fowler, 2003). The psychosocial effects may vary in association with the behavior and characteristics of particular forest fires (Fowler, 2003).

In this paper, we not only focus on individual feelings of anxiety, but we also consider collective anxiety and how it is embedded in the society and affects the behaviors related to land and forest fire. Collective anxiety is "a discrete emotion at the community level" (Yang et al., 2021, p.2). It is part of the collective emotion which are shared by many individuals in a society (Bar-Tal et al., 2007), which means the movement between individual emotions and collective emotions are likely to occur within members in a society. Therefore, individual emotions may affect a society as a whole, and collective emotions can have an impact on individual emotions. If a society has a collective anxiety over land and forest fire, it may influence the individual which has no anxiety, and if individuals in a society have a certain level of anxiety over land and forest fire, they may have an effect on the society. Thus,

individual and collective emotions may play an important role in shaping individual or community's behavior (Bar-Tal et al., 2007).

In this paper, we develop a specific scale of the anxiety over land and forest fire by systematically validating the scale with the residents in the areas that experience the disaster on an annual basis. Our research methodology is presented below in detail.

3 Methodology and results

We use Indonesia as our research setting. Land and forest fire disaster in Indonesia has been a regular event since the 1900s (Ho et al., 2014). The frequency and intensity of the fire is increasing every year (Adams, 2013). The majority of fire arise in Kalimantan and Sumatra islands, which are homes of tropical peatland. Between 2019 and 2020, the total land areas in Indonesia that were burned was 1,946,200 ha (SiPongi, 2021), with the majority of the fire concentrated in Sumatra and Kalimantan islands. Hence, the residents in Kalimantan and Sumatra islands in Indonesia (see Figure 1) are an appropriate target of respondents to develop the scale of the residents' anxiety over land and forest fire disaster.

We follow the scale development procedure proposed by Churchill (1979). We conducted three separate studies, which rigorously validate our proposed scale (see Table 1). The first study comprises of the qualitative and quantitative part of the scale development stages. The qualitative part involves literature review, focus groups and expert discussions. Our aim in this study is to seek the construct definition, items generation and items reduction. The quantitative part constitutes an exploratory factor analysis (EFA), which uncovers the dimensions or factors from the data. In the second study, we performed a confirmatory factor analysis (CFA) to examine the factor structure of the proposed scale.

We also tested the construct validity of the proposed scale using a sample of a different population, i.e., Sumatra vs Kalimantan residents. Next, in study 3a, we examined measurement invariance to test the applicability of the scale across the geographical areas

(Sumatra and Kalimantan). Finally, we tested the scale's nomological network that consists of trait anxiety as an antecedent and information channel seeking behavior across both social and non-social channels in study 3b. In the following sections, we provide our scale development process and findings.

Figure 1 The location of target respondents

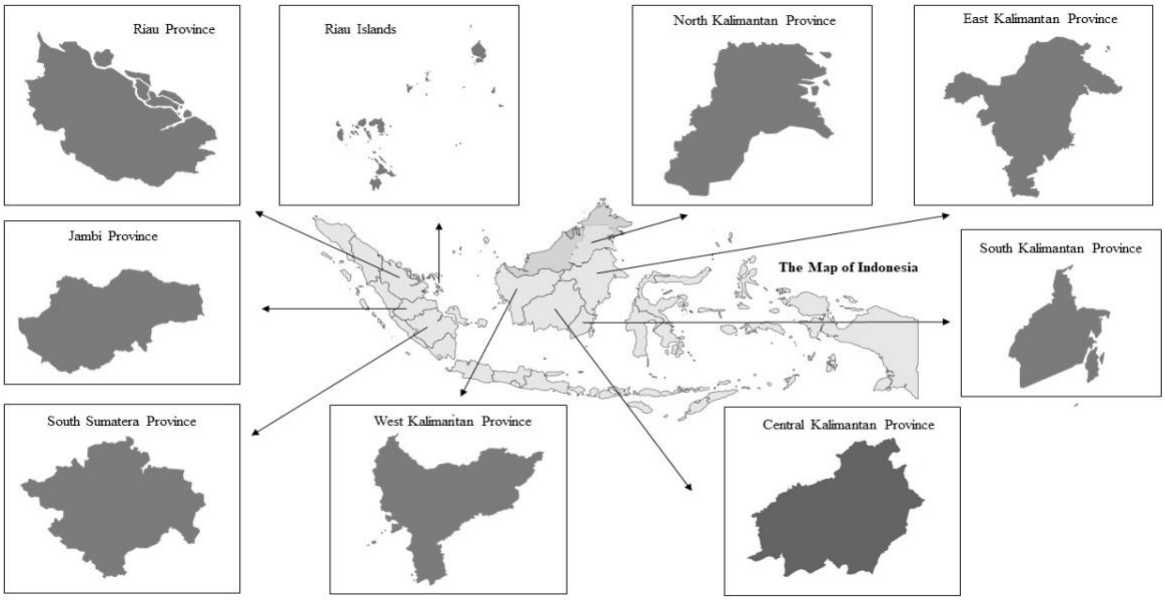


Table 1 Brief description of each study

Study	Objectives	Sample size	Sample areas
1a	Construct definition Item generation Item reduction	10	
1b	EFA to discover factors from data	430	Jambi and Riau provinces
2a	CFA to examine factorial structure	252	Jambi and Riau provinces
2b	CFA to examine the construct validity of the factorial structure	254	West Kalimantan, South Kalimantan, East Kalimantan, North Kalimantan, Central Kalimantan provinces
3a	Measurement invariance	576	Jambi, Riau, South Sumatra, Riau Islands, West Kalimantan, East Kalimantan, South Kalimantan, North Kalimantan, Central Kalimantan
3b	To test scale's nomological network	370	Jambi, Riau, South Sumatra, Riau Islands, West Kalimantan, East Kalimantan, South Kalimantan, North Kalimantan, Central Kalimantan

3.1 Construct definition (study 1a)

We began by having a preliminary qualitative study, which involved two focus group discussions. The first group consisted of three men and two women; the second group consisted of four women and one man. We selected the participants who live in land and forest fire disaster prone areas. The interviews took place via online video call. The focus group participants were asked about their opinions toward anxiety over land and forest fire. The interview questions were about the factors that cause anxiety over land and forest fire. The transcripts were analyzed and interpreted by listing items that showed similar characteristics (Lincoln and Guba, 1985). Samples of transcribed responses are given in Table 2

Table 2 Excerpt samples from focus group discussions

Participants	Comments
Participant 1	"Well, what frightens me the most is that I am worried about my health. I might have lung cancer, you know… because of smoke from the fires"
Participant 2	"I am concerned about the schools and offices. I remember last year, there were no lectures for three days. The university was shut down. The smoke was very thick, though"
Participant 3	"I am scared that my family will get sick because of the smoke… especially my parents, oh… they will get the respiratory problems"
Participant 4	"Oh God, if the forest fire gets closer to my house, I will get stressed. I will lose everything. The fire will burn down my house and nothing's left... Huh, just thinking about it makes me anxious already"
Participant 5	"You know… there will be no more forests… all gone, animals will die, no more"

The next stage is defining disaster anxiety based on the literature review. The items from the literature review were matched with the items from the focus group discussions. We generated an initial pool of 54 measurement items. Then, two subject matter experts who are senior academics evaluated the items for content and face validity. They were given the

definition of anxiety as an emotional state that can be described by an intense sense of worry (Güzel, 2022) related to land and forest fire, and instructed to retain items based on the items' representation of the anxiety domain and clarity of wording. During the content and face validity, 22 items were deleted as these items were vague and likely to lead to misinterpretation. Of the 54 initial items, the items were reduced to 32 items. In addition, we added 10 more items based on the feedback from the experts. Thus, in total there were 42 measurement items used for EFA in study 1b (see Table 3).

Table 3 Items used in EFA (Study 1b)

Survey Items
1. I'm fearful I'm choking with toxic air every day
2. I'm afraid I will have lung cancer
3. I'm terrified my eyes might get irritated because of the smoke from land and forest fire
4. I'm worried I will have long-term health problems
5. I'm concerned about my respiratory problems which cause difficulty to breathe
6. I'm scared my family will get sick because of the smoke of land and forest fire
7. I feel like land and forest fire will tear my family apart
8. I'm worried about my family well-being
9. I'm afraid my family will suffer the most from the smoke
10. I'm concerned many children will get traumatized by land and forest fire disaster
11. I'm terrified there will be major disruption of forest ecosystems
12. I'm worried there will be habitat loss
13. I'm concerned that there will be a massive extinction of animals
14. I'm anxious the land and forest fire will destroy natural vegetation
15. I'm afraid the land and forest fire will wipe out the food source and homes for many animals
16. I'm petrified that land and forest fire smoke causes dangerous air pollution
17. I'm fearful that land and forest fire will increase climate change
18. I'm worried the water will be polluted as people will drink toxic water
19. I'm afraid the land and forest fire will raise the air temperature
20. I'm concerned the smoke from the land and forest fire will affect air quality
21. I'm concerned the land and forest fire will destroy my house

Survey Items
22. I’m worried I will spend money to seek a doctor
23. I’m afraid it will cost me more to travel because the smoke causes transportation disruption
24. I'm irritated that I have to spend money to buy masks
25. I'm irritated that I have to spend money to buy air purifiers
26. I'm terrified I will lose all my possessions
27. I'm concerned I might lose my source of income
28. I'm afraid farmers will lose their income
29. I’m worried I will receive less income
30. I’m afraid many laborers might lose their jobs as many factories closed
31. I’m concerned that street vendors might lose their income as nobody wants to buy street food
32. I’m afraid the economy will slow down
33. I'm concerned tourism sector will suffer a downturn effect from the land and forest fire
34. I’m worried there will be less investment
35. I'm concerned many companies may relocate their business due to the land and forest fire
36. I’m anxious of the increased costs to overcome the land and forest fire
37. I'm anxious of the increased costs to restore the land and forest fire
38. I’m frightened there will be disturbance of food logistics
39. I’m anxious land and forest fire smoke presents disturbance of daily activities
40. I'm worried offices and stores will shut down
41. I'm terrified land and forest fire smoke brings negative effects to local economy
42. I'm concerned the smoke from land and forest fire will affect the relationship with neighboring countries

3.2 Exploratory factor analysis (study 1b)

To assess the dimensionality of the proposed scale, we conducted an EFA. We created an online survey with the 42 items and applied a translation and back translation procedure to present the survey in Indonesian language. Before the actual data collection, the survey was proofread and pretested with five individuals who are residents in Sumatera and Kalimantan to check whether they could understand the questions accurately. Several survey adjustments were made based on their feedback. We target respondents who live near the land and forest fire prone areas.

The online survey was distributed to two target provinces in Sumatra island that are prone to land and forest fire: Riau and Jambi provinces. We also asked the survey respondents to forward the link to their friends and colleagues. We included a filter question to eliminate respondents who were not from our target areas or who never experience land and forest fire. The survey also included socio-demographic variables such as gender, educational level, and occupation. We used a Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree) as response answers for the psychometric items in the survey. The online survey was distributed to two land and forest fire prone provinces in Indonesia located in Sumatra island: Riau and Jambi provinces. In total, we obtained 495 respondents. After testing data normality, we retained 430 responses as the final sample. Of the total respondents, 29.3% were male, 76.7% had a bachelor degree or higher, and 24.7% had full-time employment.

We conducted EFA with principal axis factoring and direct oblimin rotation in SPSS. We eliminated items that had loadings below 0.50 (Hair et al., 2010). Items that did not have high correlations with their respective dimension in comparison with their correlations with the other dimensions' total scores were also deleted e.g., fear of climate change, air pollution, and economic slowdown were deleted. This process led to the deletion of 21 items (see Table 4); another 21 items were retained to be used for CFA. The results indicate three-factor solutions with 68.51% of the variance explained, which exceeds the cut-off of 60% recommended by (Hair et al., 2010). The three factors are labelled as concern for habitat loss, concern for welfare and concern for wellness. All items were loaded above 0.63 and the reliability analysis conducted on each factor indicated a Cronbach's α above 0.90 (see Table 5). The data of this study explained the initial support for our scale. We conducted another study with different respondents to confirm the multidimensionality of the scale by means of CFA.

Table 4 Items deleted in EFA (Factor loadings <0.50)

Survey Items
1. I'm fearful I'm choking with toxic air every day
2. I feel like land and forest fire will tear my family apart
3. I'm worried about my family well-being
4. I’m concerned many children will get traumatized by land and forest fire disaster
5. I'm petrified that land and forest fire smoke causes dangerous air pollution
6. I'm fearful that land and forest fire will increase climate change
7. I'm worried the water will be polluted as people will drink toxic water
8. I'm afraid the land and forest fire will raise the air temperature
9. I'm concerned the smoke from the land and forest fire will affect air quality
10. I’m concerned the land and forest fire will destroy my house
11. I’m worried I will spend money to seek a doctor
12. I'm irritated that I have to spend money to buy masks
13. I'm irritated that I have to spend money to buy air purifiers
14. I'm concerned I might lose my source of income
15. I'm afraid farmers will lose their income
16. I’m worried I will receive less income
17. I’m afraid many laborers might lose their jobs as many factories closed
18. I’m afraid the economy will slow down
19. I’m anxious of the increased costs to overcome the land and forest fire
20. I'm anxious of the increased costs to restore the land and forest fire
21. I'm concerned the smoke from land and forest fire will affect the relationship with neighboring countries

Table 5 EFA factor loadings (standardized coefficients)

		Mean	**SD**	**Factor Loading**
	Concern for habitat loss, α = 0.93			
01	I'm terrified there will be major disruption of forest ecosystems because of the effect of land and forest fire	6.66	0.76	0.83
02	I'm worried there will be habitat loss because of the effect of land and forest fire	6.66	0.75	0.81
03	I'm anxious the natural vegetation will be destroyed because of the effect of land and forest fire	6.58	0.79	0.72

		Mean	SD	Factor Loading
04	I'm afraid many animals will be wiped out as the food source and homes are affected by land and forest fire	6.66	0.73	0.69
05	I'm concerned that there will be a massive extinction of animals because of the effect of land and forest fire	6.60	0.92	0.64
	Concern for welfare, α = 0.92			
01	I'm concerned many companies in my region may relocate their business because of the effect of land and forest fire	5.61	1.58	0.83
02	I'm worried offices and stores will shut down because of the effect of land and forest fire	5.84	1.41	0.75
03	I'm worried I receive less income because of the effect of land and forest fire	5.14	1.84	0.73
04	I'm worried there will be less foreign direct investment because of the effect of land and forest fire	5.92	1.48	0.73
05	I'm worried I will lose all my possessions because of the effect of land and forest fire	4.90	1.97	0.72
06	I'm afraid I will spend more money for my daily transportation because of the effect of land and forest fire	5.31	1.67	0.70
07	I'm concerned that street vendors might lose their income as nobody wants to buy street food because of the dust from the land and forest fire	6.04	1.42	0.66
08	I'm terrified that land and forest fire will have negative impact on the local economic activities	6.16	1.22	0.64
09	I'm concerned tourism sector will suffer a downturn because of the effect of land and forest fire	6.31	1.11	0.63
10	I'm frightened there will disturbance of food supply chain because of the effect of land and forest fire	6.21	1.17	0.63
	Concern for wellness, α = 0.92			
01	I'm worried I will have long term health problems because of the effect of land and forest fire	6.58	0.91	0.86
02	I'm afraid I will have lung cancer because of the effect of land and forest fire	6.52	1.01	0.86
03	I'm concerned about my respiratory problems which cause difficulty to breathe because of the effect of land and forest fire	6.71	0.72	0.74
04	I'm terrified my eyes might get irritated because of the effect of land and forest fire	6.56	0.87	0.73
05	I'm scared my family will get sick because of the effect of land and forest fire	6.74	0.77	0.71

		Mean	SD	Factor Loading
06	I'm afraid my family will suffer the most because of the effect of land and forest fire	6.48	1.00	0.70

Notes: *n* = 430; SD = Standard Deviation, percentage of total variance = 68.51%

3.3 Confirmatory factor analysis (study 2a)

For our CFA study, we distributed the 21 survey items to respondents in Riau and Jambi provinces – these respondents were different from those of the previous survey. There were 395 respondents. After checking for data normality, we obtained a final sample of 252 responses. The respondents for our CFA study were 39.3% male, more than 65% had a bachelor degree or higher, and 21.8% had full-time employment.

We conducted CFA using AMOS. Following Hair et al. (2010), we applied the CFA with Maximum Likelihood (MLM) to specify a three-dimensional measurement model that we obtained from the EFA results. Since Chi-square is sensitive to sample size, we also used Comparative Fit Index (CFI), Standardized Root Mean Square Residual (SRMR) and Root Mean Square Error Approximation (RMSEA) to test the measurement model fit. According to Hair et al. (2010), the CFI should be near 0.92 or higher, SRMR should be close to 0.08 or lower and RMSEA should be near 0.05 or lower for a good fit. At first, the results of the CFA demonstrated lack of model fit. Then, as recommended by Gerbing and Anderson (1988) and Hair et al. (2010), we deleted the items that have factor loadings less than the cut-off point (<0.50) and re-examined the model through a reiteration procedure. We removed all five items from concern for habitat loss dimension, five items from concern for welfare, and one item from concern for wellness because the factor loadings were below the threshold and the fit indices were poor. After removing the mentioned items, we reanalyzed the model and the results showed that the model had a satisfactory fit: Chi-square (x^2) = 68.859, degrees of freedom (df) = 33, the ratio of Chi-square to degrees of freedom (x^2 / df) = 2.08, RMSEA =

0.06, CFI = 0.973, TLI = 0.963 and SRMR = 0.04 to support the dimensions of the scale. The factor loadings were above 0.62 and the Cronbach's α of each dimension was above 0.80 (see Table 6). The CFA findings indicated that the anxiety over land and forest fire is a two-dimensional scale, which consists of two dimensions: concern for welfare and concern for wellness. We examined the convergent validity and discriminant validity of the focal constructs. We revealed that the composite reliability (CR) for each construct is greater than 0.70 (Nunnally, 1994). Convergent validity assessed by Average Variance Extracted (AVE) for all constructs exceeded the cut off value of 0.50. Discriminant validity was confirmed as the square root of AVE for all constructs is greater than all their corresponding correlations as suggested by Fornell and Larcker (1981) (see Table 7).

Table 6 CFA factor loadings (standardized coefficients)

		Mean	**SD**	**Factor Loading**
	Concern for welfare, α = 0.85			
01	I'm concerned many companies in my region may relocate their business because of the effect of land and forest fire	4.58	1.50	0.63
02	I'm worried offices and stores will shut down because of the effect of land and forest fire	4.87	1.56	0.71
03	I'm worried I will receive less income because of the effect of land and forest fire	4.81	1.69	0.79
04	I'm worried I will lose all my possessions because of the effect of land and forest fire	4.53	1.76	0.75
05	I'm afraid I will spend more money for my daily transportation because of the effect of land and forest fire	4.48	1.73	0.75
	Concern for wellness, α = 0.89			
01	I'm worried I will have long term health problems because of the effect of land and forest fire	6.48	0.85	0.81
02	I'm afraid I will have lung cancer because of the effect of land and forest fire	6.35	0.98	0.78
03	I'm concerned about my respiratory problems which cause difficulty to breathe because of the effect of land and forest fire	6.52	0.71	0.86

		Mean	SD	Factor Loading
04	I'm scared my family will get sick because of the effect of land and forest fire	6.56	0.67	0.69
05	I'm afraid my family will suffer the most because of the effect of land and forest fire	6.52	0.80	0.75

Notes: *n* = 252; SD = Standard Deviation, percentage of total variance = 66.92%

Table 7 Correlations among latent constructs

Construct	M	SD	AVE	CR	1	2
1. FARE	4.65	1.30	0.52	0.82	**0.72**	
2. NESS	6.48	0.67	0.63	0.88	0.44**	**0.79**

M = mean, SD = standard deviation, AVE = average variance extracted, square root of AVEs are in bold in main diagonal, CR = composite reliability, FARE= concern for welfare, NESS= concern for wellness, sample size n = 252, **p < 0.01

3.4 CFA for construct validity (study 2b)

In this study, we tested the construct validity of the measurement items with different populations. We sent the online survey link to respondents in Kalimantan (e.g., West Kalimantan, South Kalimantan, North Kalimantan, Central Kalimantan and East Kalimantan). We included a filter question which show their residency area. We deleted 43 respondents who are not living in Kalimantan; 254 valid responses were included in the statistical analysis. The respondents were 57.1% male, more than 50% of respondents had a bachelor degree or above, and 56.7% had full-time employment.

We conducted CFA with MLM. The procedure was similar to the first CFA. We also included all three dimensions that we attained from the EFA results in our CFA model. The results presented that the ratio of Chi-square to degrees of freedom (x^2 / df) = 1.55, RMSEA = 0.04, CFI = 0.989, TLI = 0.985 SRMR = 0.04, all the loading factors were above 0.60, and the Cronbach α of each dimension was above 0.80 (see Table 8). The results demonstrated a good

fit of the model. The results support the construct validity of the survey items and confirm the validity for the two dimensions of the anxiety over land and forest fire.

We also assessed the convergent validity and discriminant validity of the focal constructs. We demonstrated that CR for each construct is greater than 0.70 (Nunnally, 1994). Convergent validity assessed by AVE for all constructs exceeded the cut off value of 0.50. All constructs achieved discriminant validity, as the square root of their AVE estimates exceeded their correlations with other constructs as suggested by Fornell and Larcker (1981) (see Table 9).

Table 8 CFA factor loadings (standardized coefficients) for construct validity

		Mean	SD	Factor Loading
	Concern for welfare, α = 0.85			
01	I'm concerned many companies in my region may relocate their business because of the effect of land and forest fire	4.58	1.50	0.65
02	I'm worried offices and stores will shut down because of the effect of land and forest fire	4.87	1.56	0.75
03	I'm worried I will receive less income because of the effect of land and forest fire	4.81	1.69	0.85
04	I'm worried I will lose all my possessions because of the effect of land and forest fire	4.53	1.76	0.69
05	I'm afraid I will spend more money for my daily transportation because of the effect of land and forest fire	4.48	1.73	0.63
	Concern for wellness, α = 0.89			
01	I'm worried I will have long term health problems because of the effect of land and forest fire	6.48	0.85	0.77
02	I'm afraid I will have lung cancer because of the effect of land and forest fire	6.35	0.98	0.79
03	I'm concerned about my respiratory problems which cause difficulty to breathe because of the effect of land and forest fire	6.52	0.71	0.88
04	I'm scared my family will get sick because of the effect of land and forest fire	6.56	0.67	0.89
05	I'm afraid my family will suffer the most because of the effect of land and forest fire	6.52	0.80	0.82

Notes: *n*= 254; SD = Standard Deviation, percentage of total variance = 71.14%

Table 9 Correlations among latent constructs

Construct	M	SD	AVE	CR	1	2
1. FARE	4.68	1.27	0.52	0.80	**0.72**	
2. NESS	6.21	0.71	0.68	0.88	0.19**	**0.82**

M = mean, SD = standard deviation, AVE = average variance extracted, square root of AVEs are in bold in main diagonal, CR = composite reliability, FARE= concern for welfare, NESS= concern for wellness, sample size n = 254, **p < 0.01

3.5 Measurement invariance across geographical areas (study 3a)

We performed measurement invariance to establish the generalizability of the scale. We followed the process as described by Steenkamp and Baumgartner (1998) and by using a sample set from Sumatra and Kalimantan islands. The process involved (1) configural invariance, (2) metric invariance, and (3) scalar invariance. Configural invariance tests whether the same basic factor structure holds for the two groups of respondents. Metric invariance tests whether factor loadings are equal across the groups. Scalar invariance entails whether there are differences in the means of the observed items and underlying constructs.

We first tested the CFA of Sumatra and Kalimantan respondents respectively; the results of model fit indices showed both models were satisfactory (see Table 10). Then, we assessed the configural invariance by conducting a multi-group CFA of the two dimensions of land and forest fire anxiety. There was support for configural invariance, as indicated by the satisfactory CFI = 0.996, RMSEA = 0.026, and TLI = 0.991. Next, we measured metric invariance by comparing the fit of a model in which the factor loadings were constrained to be equal to the fit of a freely estimated model. The results of this analysis supported metric invariance as indicated by the fit indices in Table 11, suggesting that the factor loadings are constant across the two samples. It means that the responses from the Sumatra and Kalimantan respondents attribute the same meaning to the latent construct. Finally, we tested for scalar invariance. This was assessed by placing equality constraints on the intercepts, which represent the estimated value of an observed variable when the latent construct is equal to zero (Hancock, 1997). The

scalar invariance was also supported in this study (see Table 11). The values of the fit indices were at acceptable levels. The supports for configural, metric, and scalar invariance provide empirical evidence for the construct validity of the land and forest fire anxiety.

Table 10 Summary of model fit indices for Sumatra and Kalimantan

Model	**x^2**	***df***	**CFI**	**TLI**	**RMSEA**	**SRMR**
Sumatra (n = 221)	30.4	24	0.996	0.989	0.034	0.040
Kalimantan (n = 345)	37.7	24	0.994	0.985	0.041	0.030

Table 11 Measurement invariance across geographical areas (Sumatra and Kalimantan)

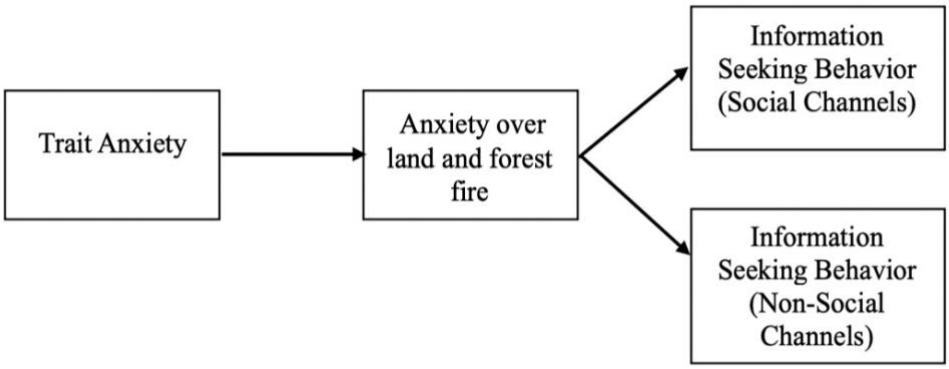
Model	**x^2**	***df***	**Δx^2**	**Δdf**	**RMSEA**	**CFI**	**TLI**
Configural Invariance	68.7**	35			0.026	0.996	0.991
Metric Invariance	115.8***	50	47.1	15	0.036	0.986	0.980
Scalar Invariance	250.6***	67	134.8	17	0.053	0.972	0.961

Notes: ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$, Δx^2 and Δdf tests were conducted between each step and the previous step.

3.6 Nomological network (study 3b)

The final study examines nomological network. The purpose is to examine the connection of land and forest fire anxiety to other constructs. We performed the nomological network by having trait anxiety as an antecedent and information channel seeking behavior across both social and non-social channels as the outcomes of the anxiety over land and forest fire (see Figure 2).

Figure 2 Nomological Network Design



Trait anxiety is a generalized and enduring predisposition to react to many situations in a consistent manner (Endler and Kocovski, 2001). Trait anxiety could be treated as an independent variable in predicting behaviors (De Man et al., 1984). It is likely that the level of state anxiety depends on trait anxiety (William Li and Lopez, 2005). Anxiety over land and forest fire is state anxiety. Therefore, we predict that the residents' trait anxiety positively affects their anxiety over land and forest fire. To measure trait anxiety, we adopted the trait anxiety inventory items from Spielberger (1983) which consists of 20 items.

One of the outcomes of anxiety over land and forest fire is information seeking behavior. It is predicted that higher level of anxiety is associated with greater level of information seeking (Liu et al., 2016). Since information sources play an important role in information seeking during disaster (Steelman et al., 2015), it becomes essential to understand the information sources that people seek information from (Ryan, 2013). When seeking information, the individual may interact with newspaper, websites, or other information channels (Wilson, 2000). In this research, we assessed two different channels i.e., social (social media, family, friends, neighbors) and non-social channels (television, newspapers, Government websites, Government app). To measure information channel seeking behavior, we adopted items from Liu et al. (2016) that consist of four survey items for information seeking behavior through

social channels and another four items for information seeking behavior through non-social channels.

The survey was distributed to several provinces in Sumatra (i.e., Jambi, Riau, Riau Islands and South Sumatra) and Kalimantan (i.e., West Kalimantan, South Kalimantan, North Kalimantan, Central Kalimantan and East Kalimantan). We sent an online survey link to the targeted respondents. We obtained 370 respondents altogether; 35.1% of the respondents were male, 45.7% were in full-time employment, and more than 80% had a bachelor degree or higher. We carried out SEM to examine the regression and covariance structures as recommended by Bagozzi (1980). We adopted a four-point scale ranging from 1 (almost never) to 4 (almost always) as responses to the trait anxiety inventory from Spielberger (1983). We used a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree) as responses for the rest of the items. We also checked the convergent validity and discriminant validity of all main constructs. The CR for each scale was greater than 0.70 (Nunnally, 1994), the AVE for all constructs surpassed 0.50 and the square root of AVE for all constructs was greater than all their corresponding correlations (Fornell and Larcker, 1981) (see Table 12).

SEM was employed to test the nomological network between the anxiety over land and forest fire with the antecedent and two behavioral outcomes. We also controlled for gender, education level and occupation. Prior to the test, we conducted first-order CFA to check the goodness of fit of the model. The results demonstrated that all indices were above the cut-off value. The ratio of Chi-square to degrees of freedom (x2 / df) = 1.70, CFI = 0.989, TLI = 0.985, RMSEA = 0.044, and SRMR = 0.041. The fit indices for the second-order factor indicated an acceptable goodness of fit of the data. The ratio of Chi-square to degrees of freedom (x2 / df) = 1.97, CFI = 0.964, TLI = 0.957, RMSEA = 0.051, and SRMR = 0.064. After these checks, we developed the structural model for the nomological network. The standardized regression coefficient is presented in Table 13.

Table 12 Correlations among latent constructs

Construct	M	SD	AVE	CR	1	2	3	4
1. TRA	2.05	0.59	0.59	0.85	**0.76**			
2. ANXIETY	5.73	0.66	0.70	0.97	0.14**	**0.83**		
3. SOC	5.31	1.07	0.68	0.89	-0.03 ns	0.40***	**0.82**	
4. NONSOC	5.74	0.92	0.47	0.78	0.03 ns	0.30***	0.46*******	**0.68**

M = mean, SD = standard deviation, AVE = average variance extracted, square root of AVEs are in bold in main diagonal, CR = composite reliability, ANXIETY = anxiety over land and forest fire, TRA = trait anxiety, SOC= information seeking from social channels, NONSOC= information seeking from non-social channels, sample size n = 370, **p < 0.01, ***p < 0.01, ns= not significant

Table 13 Standardized regression coefficient

			Coefficient	**S.E.**	**P**
TRA	→	ANXIETY	0.203*	.091	.013
ANXIETY	→	SOC	0.472***	.220	.000
ANXIETY	→	NONSOC	0.487***	.221	.000

Sample size n = 370, p < 0.05*, p < 0.01** p < 0.001***
TRA = Trait Anxiety, ANXIETY = Anxiety over land and forest fire, SOC = Information Seeking from Social Channels, NONSOC = Information Seeking from Non-Social Channels

All relationships in our nomological network model are statistically significant. The results indicate a positive and significant effect of trait anxiety on anxiety over land and forest fire (b = 0.203, p < 0.05), which means trait anxiety affects anxiety over land and forest fire. The results further show a significant effect of anxiety over land and forest fire on information seeking behavior from social channels (b = 0.472, p < 0.001) as well as non-social channels (b = 0.487, p < 0.001), which demonstrate that anxiety over land and forest fire influences how residents seeking information either via social channels or non-social channels (Liu et al., 2016). Thus, the findings support the nomological validity of the scale developed.

3.7 Common method bias

Common method bias may affect the validity and reliability of the research results (Baumgartner and Steenkamp, 2001), and it can occur when the independent and dependent variables are assessed using the same response method in one survey. In order to avoid common method bias, we applied the procedural techniques as suggested by Podsakoff et al. (2003) in structuring our survey in each study. We kept the survey questions simple, specific and concise. We used different scaling techniques, such as by including 4-point and 7-point Likert scales or by altering the formats of the scale from a 'strongly disagree to strongly agree' to a frequency scale using 'almost never to almost always'. We also used reversed coded items and wordings. Finally, some uncorrelated survey items were included in the survey to prevent random clicking from the survey participants.

3.8 Post-Hoc Analysis

The purpose of this analysis is to check whether there are significant differences across the student and non-student samples using measurement invariance as suggested by Steenkamp and Baumgartner (1998). We used a sample set from Sumatra and Kalimantan islands from previous studies. The total sample was 858 which consisted of 462 non-students and 396 students. The summary results of the model fit indices can be seen in Table 14.

We tested the configural invariance by conducting a multi-group CFA of the two dimensions of land and forest fire anxiety. There was support for configural invariance, as indicated by the satisfactory fit indices; CFI = 0.995, RMSEA = 0.025, and TLI = 0.991. Given that configural invariance was supported, we were able to test metric invariance. We examined a model in which the unstandardized relationships between the items and factors were constrained to be equal across student and non-student samples. We found support for metric invariance as the results showed goodness-of-fit (see Table 15), suggesting that the items have

similar meaning to the latent construct for both samples. Given the support for metric invariance, we assessed scalar invariance. We also found support for scalar invariance. The indices showed an acceptable fit to the data (see Table 15). Hence, the invariance was supported at three levels: configural, metric and scalar. These results suggest that our scale of anxiety over land and forest fire is equivalent across students and non-students.

Table 14 Summary of model fit indices for student and non-student

Model	$\mathbf{x^2}$	***df***	**CFI**	**TLI**	**RMSEA**	**SRMR**
Student (n = 396)	38.6	26	0.994	0.989	0.035	0.040
Non-Student (n = 462)	52.3	26	0.992	0.986	0.047	0.038

Table 15 Measurement invariance (student and non-student)

Model	$\mathbf{x^2}$	***df***	$\mathbf{\Delta x^2}$	$\mathbf{\Delta}$***df***	**RMSEA**	**CFI**	**TLI**
Configural Invariance	73.9*	48			0.025	0.995	0.991
Metric Invariance	119.8***	60	45.9	12	0.034	0.989	0.983
Scalar Invariance	269.8***	70	150	10	0.054	0.962	0.951

Notes: ***$p < 0.001$, *$p < 0.05$, Δx^2 and Δdf tests were conducted between each step and the previous step.

4 Discussions and implications

Understanding anxiety in the context of land and forest fire is important because anxiety can stimulate behaviors which can lead residents to prepare for plausible disaster (Kemp et al., 2014). The way residents react to fire threat is different to one another. Some people may evacuate immediately, while some others may delay the evacuation (McLennan et al., 2019). This is because they are hesitating between defending or evacuating themselves from the fire (McNeill et al., 2014). Simply put, residents who realize that they are in danger, feel trapped to defend their livestock and property while at the same time they want to save their family. For example, in a recent wildfire in Spain (Crisp, 2022), a man did not want to relocate as he

wanted to protect his land. This situation could put his life and his family at risk. Emotional factor such as disaster anxiety may prepare the residents for immediate action when the disaster strikes (Kemp et al., 2021). Residents who have high anxiety over the land and forest fire will have the tendency to evacuate immediately to protect themselves and their loved ones. Residents who have low anxiety over land and forest fire may need a push from the authorities to evacuate through early warning or frequent disaster drills.

Despite the importance of and scholarly interest in the negative impact of land and forest fire, there has not been a reliable and valid scale that aim to measure anxiety that individual experiences in response to the potential disaster. In this research, we developed and validated a two-dimensional scale of measure anxiety over land and forest fire by following the scale development approach proposed by Churchill (1979).

In our scale development process, we involved residents who live in land and forest fire disaster prone areas. Our scale was developed and tested in three studies in various geographical areas. We also tested the nomological network using our newly developed scale, and the results confirm the validity of our scale. Our study contributes to the existing literature by uncovering two dimensions of worried thoughts in relation to the anxiety over land and forest fire, i.e., concern for welfare and concern for wellness.

Reflecting on our nomological network results, we find a significant positive relationship between the level of anxiety over land and forest fire and the residents' information seeking behaviors. This means residents with high level of anxiety over land and forest fire are likely to be more active in seeking information. By regularly evaluating the residents' level of anxiety, the government can identify the individuals on whom to target their information dissemination regarding land and forest fire. These individuals will then serve as information points to the others within their residential area.

5 Limitations and further research

Like any other research, our study also has some limitations. First, our study samples are limited to those who live near to the potential land and forest fire in Indonesia. Thus, it can limit the generalizability of the scale. To increase the construct validity of the scale, further research can extend our studies in a different country, for example, by targeting residents who are currently exposed to the recent heatwave wildfires in Europe. Second, we limit the scope of our study and we only measure individual anxiety. To what extent there is a spillover effect from collective worry to individual worry, and how the dynamic of individual anxiety contributes to the formation of collective anxiety are not examined. This might be an interesting agenda for future research. Future research may also test the generalizability of the scale in other contexts e.g., anxiety of forest fire in Los Angeles, US. Third, in testing our nomological network, our model predicts that anxiety over land and forest fire positively affects information seeking behavior. Because, this result was based on a hypothetical scenario, we cannot make inferences about residents who are anticipating land and forest fire and how anxiety influences their coping behaviors (e.g., disaster preparedness). Future research can address this limitation by involving individuals who are vulnerable to imminent land and forest fire.

In many natural disaster incidents, residents were reluctance to relocate. Indeed, past studies in place attachment research revealed that residents' sense of belonging to their places discourage them to leave their home (Asfaw et al., 2019; Sahagun et al., 2016). We posit that place attachment might reduce the effect of anxiety over land and forest fire on relocation behavior. That is, anxiety over land and forest fire may act as a moderator of the relationship between anxiety over land and forest fire. This might constitute a potential research avenue.

6 Conclusion

Our study contributes to anxiety and disaster literature by developing and validating a new scale of anxiety over land and forest fire. We find that anxiety over land and forest fire is a

two-dimensional scale. We refine our scale and provide evidence of the validity and reliability of the scale through three studies. Our results are reassuring and indicate that the scale can be used by researchers to examine the anxiety of residents who regularly experience land and forest fire. Understanding the residents' anxiety over land and forest fire is useful for government to mitigate the impact of land and forest fire. By doing so, the government can apply any corrective measures to increase disaster preparedness among residents.

CHAPTER 3

Examining the Relationship between Anxiety over Land and Forest Fire, Environmental Knowledge, and Purchase Intention towards Certified Palm Oil Products: Empirical Studies in Indonesia

Abstract

Many consumers live in disaster-prone areas (e.g., land and forest fire prone areas). However, research on their disaster anxiety and consumption behavior is limited. We address this gap in the literature by assessing the relationship between the residents' anxiety over land and forest fire and their purchase intention towards certified palm oil products. Using our newly developed scale of anxiety over land and forest fire, we assessed the relationship between anxiety over land and forest fire, environmental knowledge and purchase intention towards certified palm oil products (H1 and H2). Next, we examined whether attitude towards certified palm oil products mediate the relationships (H3 and H4). Our results suggest that the residents' anxiety over land and forest fire has a positive relationship on their purchase intention towards certified palm oil products, which is fully mediated by their attitude towards certified palm oil products. Environmental knowledge also has a positive effect on purchase intention towards certified palm oil products, which is partially mediated by attitude towards certified palm oil products. Our study contributes to the palm oil consumption studies and presents important implications for government and marketers.

Keywords: Anxiety over land and forest fire, environmental knowledge, certified palm oil products, purchase intention

1 Introduction

Palm oil is the most produced vegetable oil in the world Hansen et al. (2015). It is primarily used for food, and it is often utilized as one of the key ingredients for non-food items such as soaps, detergents, cosmetic products, and biodiesel. According to Shigetomi et al. (2020), the global demand for palm oil is increasing because of the versatility of the oil for producing daily goods and its potential as a source of renewable energy. That has resulted in a dependency on palm oil producing countries and a dramatic growth of palm oil plantations in order to meet the needs of the world market. Indonesia is the largest palm oil producer and the biggest palm oil exporter in the world with a total area of oil palm plantations of 14.6 ha (Statista, 2021). The expansion of palm oil plantations in Indonesia to meet global demand has caused several impacts such as land-use change, movements of people and settlement, and social conflicts (Carlson et al., 2018). Likewise, the massive use of palm oil itself has generated some controversies on its production (Dentoni et al., 2018). Primarily, palm oil plantations' expansion has been linked to environmental damage and is the major trigger of deforestation (Capecchi et al., 2019; Carlson et al., 2018; Gassler and Spiller, 2018; Koh and Wilcove, 2008), which leads to climate change and biodiversity loss (Cattau et al., 2016; Sundaraja et al., 2021a; Verneau et al., 2019).

Deforestation in Indonesia is one of the highest rates of primary forest loss in the world, and the expansion of palm oil plantation has been associated to this loss (Margono et al., 2014). The practice to expand palm oil plantations by doing "slash-and-burn", which is a common way to clear a land and start a new plantation, has always led to forest fire and contributed to serious consequences i.e., air pollution, global warming (Gatti et al., 2019; Verneau et al., 2019), and anxiety amongst residents who live near the fire (Kemp et al., 2014). This practice is responsible for the increase of the frequency and severity of land and forest fire in Indonesia. Data shows that around 3 million ha of land burned over 2016 – 2021 (SiPongi, 2021). In

response to these risks, the Roundtable Sustainable Palm Oil (RSPO) was built to support sustainable palm oil which aims to increase the environmental performance of producers and users of palm oil (Laurance et al., 2010). The sustainable palm oil is also the result of the substantial demand for palm oil (Fougère and Solitander, 2020). The idea of RSPO certification is to disallow the use of fire for preparing new land for planting and replanting in order to minimize the forest fire risk on palm oil plantations (RSPO, 2004).

Regardless of the effort to increase the sustainability of palm oil, RSPO certification raises two opposing stands amongst consumers. Some studies showed that consumers are positive about certified palm oil products (Gassler and Spiller, 2018; Ostfeld et al., 2019), while other studies revealed that consumers conveyed a negative attitude toward certified palm oil products (Hinkes and Christoph-Schulz, 2019; Sundaraja et al., 2021a). Interestingly, previous studies also found that consumers are more likely to purchase palm oil free products than certified palm oil products (Capecchi et al., 2019; Hinkes and Christoph-Schulz, 2020). There are several possible explanations for these different findings. First, consumers are concerned about the effect on sustainability issues. Hence, consumers tend to avoid products that contain palm oil because it has been associated with something unhealthy and 'bad' for the environment (Hartmann et al., 2018). Following the concerns, for example, some industries in Italy have begun to eliminate the use of palm oil from their products (Verneau et al., 2019). Second, consumers have some knowledge barriers to certified palm oil products (Sundaraja et al., 2021b). That is, some consumers claimed that certified palm oil labels are only for educated people (Hinkes and Christoph-Schulz, 2019). Third, consumers are different in terms of their willingness to pay for certified palm oil products. Some studies showed that consumers are reluctant to pay a premium for RSPO products considering their budget, while others are willing to pay higher prices for RSPO products (Gassler and Spiller, 2018; Hinkes and Christoph-Schulz, 2019). Fourth, consumers have low appreciation of the certification labels

because they feel that many certification systems and their criteria are not clear (Sundaraja et al., 2021a).

While offering some important insights, there are three limitations of the past studies on palm oil consumption. First, these studies do not take consumers' emotional factors into consideration in explaining their attitudes toward certified palm oil products and purchase intentions, which is surprising as various consumers' consumption stages hinge on emotionally related factors (Cronin Jr et al. 2000; Gregory-Smith et al. 2013). One of the emotional factors relevant in studying consumers' consumption is anxiety (Raghunathan et al., 2006), which is the focus of our research. Second, past studies have not conducted their studies in palm oil producing countries. For example, Capecchi et al (2019) and Gassler and Spiller (2018) examine Italian and German consumers' attitudes toward palm oil products respectively, who are not residents of palm oil producing countries. Furthermore, these consumers never experience the incidents of forest fire due to the expansion of palm oil plantations. Therefore, the attitude of residents from a palm oil producing country on palm oil products, and how this attitude is affected by their anxiety toward forest fires is less understood. Third, findings of past studies of the relationship between environmental knowledge and pro-environmental behavior were inconsistent (Choi and Johnson, 2019; Vicente-Molina et al., 2013). Some studies found a negative relationship between environmental knowledge and purchase intention towards environmentally friendly products (Asvatourian et al., 2018; Wang et al., 2014). Other studies revealed that environmental knowledge had a positive relationship with purchase intention towards environmentally friendly products (Bamberg and Möser, 2007). Thus, we need to examine the impact of environmental knowledge on purchase intention towards certified palm oil products.

In this study, we attempt to address the above limitations by making contributions. Our aim is to contribute to the literature on palm oil consumption by considering an emotional

factor of anxiety over land and forest fire, and environmental knowledge which is a cognitive factor, in explaining consumers' intention to purchase palm oil products. We examine the relationship between anxiety over land and forest fire, environmental knowledge and purchase intention towards certified palm oil products of the consumers from a palm oil producing country, especially those who live near the forest fire prone area. Targeting consumers who are residents of the palm oil producing country is of paramount importance to this study for the following reasons. Firstly, the residents are prone to experience negative impacts from the forest fire compared to non-residents who are not from palm oil producing countries. Secondly, the residents might endure prolonged anxiety over land and forest fire.

In the next section, we present a review of the literature then formulate our hypotheses. Next, we describe our methodological approach. We then present and discuss our results. Finally, the conclusions and implications of our research are presented in the last section of the paper.

2 Theory and hypotheses

2.1 Certified palm oil products

Palm oil certification is a certification label system that includes social and environmental standards for palm oil production that was developed by RSPO (Hinkes and Christoph-Schulz, 2019). RSPO aims to decrease the negative effects of palm oil as it prohibits the use of fire to prepare new land (Cattau et al., 2016). RSPO also have the potential to reduce forest loss (Carlson et al., 2018). However, studies of certified palm oil have gained mixed results. Some studies reported that RSPO certified plantations have lower rates of deforestation than non-certified plantations (Cattau et al., 2016; Sundaraja et al., 2021b). Other studies showed that certified palm oil does not differ much from the non-certified ones (Gatti et al., 2019; Morgans

et al., 2018). Similarly, drawing from a study conducted in Indonesia, Carlson et al. (2018) revealed that such certification has no impact on forest loss or forest fire reduction.

Despite the different findings, palm oil certification was initially developed to achieve environmental sustainability (Laurance et al., 2010). The certification system is considered to be an important tool for increasing sustainable consumption (Thøgersen et al., 2010). Several studies explain relevant factors determining whether consumers pay attention to certification labels and adopt them in a purchasing situation (Grunert et al., 2014; Thøgersen, 2000). According to these studies, consumers consciously purchase products with a certification label only if they are motivated. They need to be concerned about the environmental issues and aim for sustainable development. This means that consumers need to be convinced that purchasing certified palm oil products contributes to achieving a sustainable environment. However, certification in the palm oil industry has also attracted some polemics. Consumers are in doubt about purchasing certified palm oil products because of the environmental effect of palm oil (Sundaraja et al., 2021a). Palm oil is also viewed as one of the main sources of forest fire, in which this fire can cause anxiety amongst the residents who live near the fire prone areas.

2.2 Anxiety over land and forest fire

Anxiety refers to an emotion that is portrayed in one's characteristic of responding to future danger or misfortune (American Psychiatric Association)[3]. The feeling of anxiety is interpreted as a signal that the environment is uncertain and uncontrollable (Raghunathan et al., 2006). Anxiety may come from some unrelated sources and it usually occurs when people are exposed to a potentially dangerous situation (Harrigan et al., 2004) e.g. a disaster. Forest fire disaster is one of the provoking situations that can shatter the environment (Verneau et al., 2019), damage

[3] https://www.apa.org/topics/anxiety

human health (Barber and Schweithelm, 2000), destroy homes and crops (Tacconi, 2003), and disturb the economy (Edwards et al., 2020). The experience of a disaster may elicit a range of stress responses and cause anxiety amongst the residents who are impacted by the incident (Kemp et al., 2014). In the same vein, some studies found that forest fire may have psychological effects and trigger anxiety amongst residents who live near the disaster prone areas (Eisenman et al., 2015; Kolaitis et al., 2011).

On the one hand, forest fire is often caused by the land use practice to expand the palm oil plantation (Carlson et al., 2018); on the other hand, residents from the palm oil producing country depend on palm oil for their daily consumption even though they are impacted by the forest fire and might experience prolonged anxiety. Nonetheless, we have very little understanding about how the residents' anxiety over land and forest fire relates to their attitude and willingness to purchase certified palm oil products. The understanding of such anxiety is important because it allows us to grasp how the residents' levels of anxiety over land and forest fire could influence their attitude and purchase intention toward certified palm oil products.

2.3 Anxiety over land and forest fire and purchase intention towards certified palm oil products

The limited research around palm oil consumption highlighted the positive impacts of palm oil as a source of renewable energy (de Vries et al., 2010; Verneau et al., 2019) and the most productive oil crop (Basiron, 2007), and the negative impacts of palm oil such as deforestation (Carlson et al., 2018), biodiversity loss (Koh and Wilcove, 2008), health problems (McNamara, 2010), and greenhouse gas emissions (Reijnders and Huijbregts, 2008). Past studies have also highlighted consumers' decisions on the certified and non-certified palm oil (Ostfeld et al., 2019; Sundaraja et al., 2021a). To this end, past studies neglect the importance of emotion in assessing the purchase intention towards certified palm oil products. One of the

emotions that might influence consumers to purchase certified palm oil products is anxiety over land and forest fire. Consumer behavior studies have assessed the interactions between various emotions and consumption process (Gregory-Smith et al., 2013) and found that people make judgments and decisions by inspecting their feelings and interpreting what their emotions mean (Schwarz, 1990).

Previous research on sustainable consumption has documented that there is a positive link between emotions and purchase intention (Antonetti and Maklan, 2014; Harth et al., 2013; Peloza et al., 2013). An example here is from Antonetti and Maklan (2014)'s study, which reveals that pride and guilt have positive influence on purchase intentions of sustainable products. Consistently, based on the results of Peloza et al. (2013), guilt as a negative emotion also has a positive impact on environmental intentions. In spite of the literature discussing palm oil consumption and sustainable consumption, what remains unclear is how anxiety over land and forest fire is related to consumers' purchase intention towards certified palm oil products. In general, anxiety can impact behavior and decision (Kemp et al., 2021). Prior research has shown that the experience of anxiety in response to disastrous event will lead to selective behaviors (Jin, 2009; Lerner and Keltner, 2000). Further, Kemp et al. (2021) argued that anxiety will activate behaviors that allow individuals to prepare and protect themselves from future catastrophic events. Raghunathan et al. (2006) mentioned that in order to reduce anxiety, consumers will have a preference for options that are safer and provide a sense of control.

Taken together, we argue that anxiety over land and forest fire can have an impact on consumers' purchase intention towards certified palm oil products. Buying certified palm oil products is part of environmental movements. Consumers who have anxiety over land and forest fires may foresee that such action will relieve their anxiety and help to sustain the environment. Thus, consumers would act in a possible manner to reduce their impact on the environment by purchasing sustainable products. This leads us to the following hypothesis:

Hypothesis 1. Anxiety over land and forest fire is positively related to purchase intention towards certified palm oil products

2.4 Environmental knowledge and purchase intention towards certified palm oil products

Environmental knowledge refers to individuals' general knowledge about the surrounding environment (Diamantopoulos et al., 2003; Vicente-Molina et al., 2013), which affects individuals' motivation to act in an environmentally friendly way (Bamberg and Möser, 2007). Some studies show that environmental knowledge has a positive relationship on purchase behavior towards environmentally friendly products (e.g., organic products) (Flamm, 2009; Thøgersen et al., 2010). Other studies show no significant relationship between environmental knowledge and purchase intention towards environmentally friendly products (Choi and Johnson, 2019).

In recent research of palm oil consumption, a study by Lange and Coremans (2020) showed that environmental knowledge positively influences consumers' consumption behavior. Consumers will be motivated to act in a responsible way to protect the environment if they are more aware of the environmental causes and impacts (Barber et al., 2009). Drawing from the previous literature, we argue that consumers' knowledge about certified palm oil products could potentially influence them to purchase certified palm oil products. We therefore hypothesize:

Hypothesis 2. Environmental knowledge has a positive impact on purchase intention towards certified palm oil products

2.5 The mediating role of attitude towards certified palm oil products

Attitude has been described as the degree to which individuals have a favourable or unfavourable assessment of a particular object (Tonglet et al., 2004). In a similar vein, Bagozzi et al. (1999) defines attitude as resources used for expressing positive or negative evaluation of human behavior, and states of affairs and emotions. Eagly et al. (1994) summarized the main characteristics of attitude as being both cognitive (thinking) and affective (emotion). In this sense, anxiety has been found to positively influence attitude towards environmental behavior (Gao et al., 2021). Attitude influences consumers to act in a certain way (Stern, 2000) which can affect purchase intention (Ajzen, 1991). Previous studies on green products and environment-related behaviors have supported the positive association between attitude and green purchase intention (Hartmann and Apaolaza-Ibáñez, 2012; Sreen et al., 2018; Verma et al., 2019). Further, past studies on palm oil consumption found a positive link between attitude towards certified palm oil products and purchase intention towards certified palm oil products (Ostfeld et al., 2019). This positive attitude has also been confirmed in Gassler and Spiller (2018) using data from Germany. Despite the evidence of a positive link between attitude and purchase intention towards certified palm oil products, some studies have demonstrated negative attitude towards certified palm oil products (Hinkes and Christoph-Schulz, 2019; Sundaraja et al., 2021a). Some other studies have found that consumers prefer to buy palm free oil products rather than certified palm oil products (Capecchi et al., 2019).

Anxiety over land and forest fire could promote a positive attitude toward certified palm oil products which might lead to purchase intention. In recent studies, anxiety is considered to be positively linked to a constructive and adaptive response to environmental behavior (Clayton and Karazsia, 2020; Gao et al., 2021). Gao et al. (2021) find that people who have high environmental anxiety are likely to perform environmental actions. Similarly, previous studies found that anxiety may lead to positive changes in environmental behavior (Meneses,

2010; Wang and Wu, 2016). This means that anxiety over land and forest fire are likely to enhance consumers' attitude towards certified palm oil products, as the more consumers become anxious, their level of awareness on the environment will increase and they may have a positive attitude towards certified palm oil products. In other words, we predict that attitude towards certified palm oil products could explain the relationship between anxiety of land and forest fire and purchase intention towards certified palm oil products. Thus, we propose the following hypothesis.

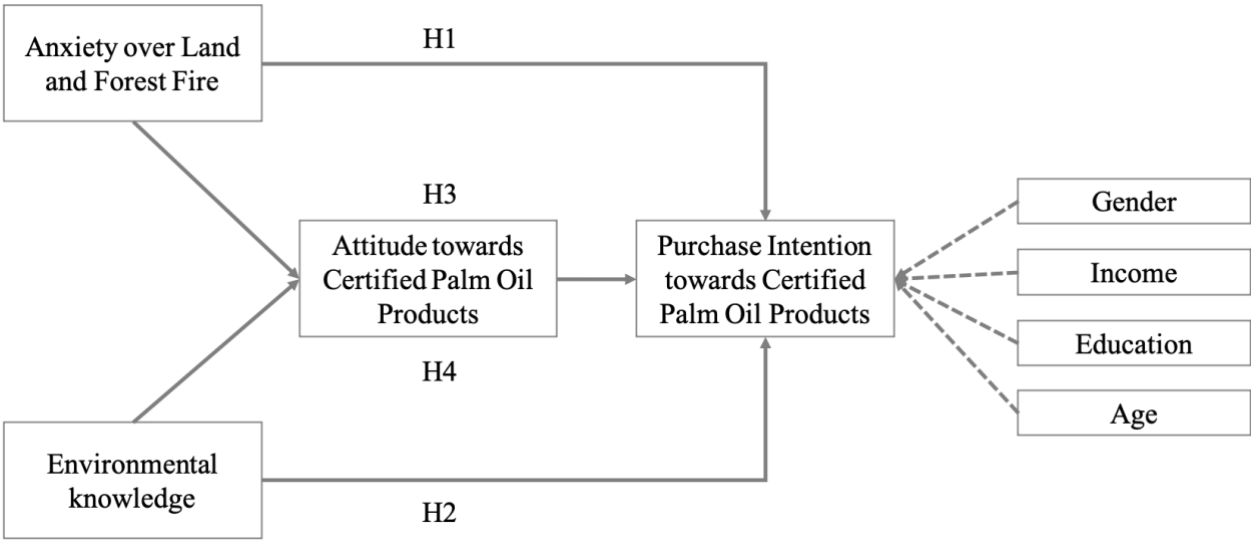
Hypothesis 3. Attitude towards certified palm oil products mediates the relationship of anxiety over land and forest fire on purchase intention towards certified palm oil products

Paço and Lavrador (2017) highlighted that knowledge plays a role in influencing behavior through attitudes. Previous research found that consumers with greater environmental knowledge tend to act in an environmentally positive manner (Mostafa, 2007; Thøgersen et al., 2012). Wang et al. (2019) found significant relationships between environmental knowledge, attitude, and green purchase intention. Environmental knowledge may alter consumers' attitudes, and both environmental knowledge and attitude may affect environmentally friendly purchase behavior (Polonsky et al., 2012). Using this result in the present research context, we argue that when consumers have environmental knowledge about certified palm oil products, they will form a positive attitude towards certified palm oil products, which in turn increases their intention to purchase certified palm oil products. Accordingly, we hypothesize:

Hypothesis 4. Attitude towards certified palm oil products mediates the relationship of environmental knowledge on purchase intention towards certified palm oil products

We present our conceptual model depicting our hypotheses in Figure 1.

Figure 1 Conceptual model



3 Hypotheses Testing

3.1 Anxiety over land and forest fire, environmental knowledge and purchase intention towards certified palm oil products (H1 and H2)

3.1.1 Sample and data collection

We began to collect data to test our hypotheses using an online survey. Before launching our survey, we sent our survey to a proof reader and then we pretested the survey with five individuals who are residents in Sumatera or Kalimantan to determine whether they could comprehend the questions correctly. Following this, we sent the online survey link to the residents in several provinces in Sumatera (i.e., Jambi, Riau, and South Sumatera) and Kalimantan (i.e., South Kalimantan, West Kalimantan, North Kalimantan, East Kalimantan and Central Kalimantan). We sent the survey link to the targeted respondents. We also asked the survey respondents to send the link to their friends and colleagues. A total of 502 valid

responses were included in the statistical analysis. The respondents were 37.8% male, 79.2% had a bachelor degree or above, and 54.8% had full-time employment.

3.1.2 Measures

We adopted a seven-point Likert scale to measure all of our relevant items, anchored at strongly disagree (1) to strongly agree (7). We also included several unrelated survey questions with a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) and used reverse-coded items. As aforementioned, this is a technique to avoid CMB as suggested by Podsakoff et al. (2003). To measure anxiety over land and forest fires, we used our previously developed and validated scale of anxiety over land and forest fires (Fatricia et al., 2023). We measured purchase intention towards certified palm oil products by adapting the four-items scale from Armitage and Conner (1999) (e.g., "I intend to purchase certified palm oil products"). We measured environmental knowledge of certified palm oil products by adapting the three-items scale from Darnall et al. (2018) and Thøgersen et al. (2010) (e.g., "I know about certified palm oil products"). All survey items are presented in Table 1.

3.1.3 Measurement models

We conducted a CFA using the R package lavaan (Rosseel, 2012) to assess the reliability and validity of our constructs by treating anxiety over land and forest fires as a second-order factor. We included the loading factors of the first-order and second-order factors. All the loading factors were above 0.60 (see Table 1). The results indicated an acceptable goodness of fit of the data (Chi-square = 581.952, df = 167, CFI = 0.971, TLI = 0.963, RMSEA = 0.070, SRMR = 0.050). We examined the internal consistency reliability, convergent validity and discriminant validity of the focal constructs. We revealed that Cronbach's alpha was more than 0.80 (Hair et al., 2010). The composite reliability (CR) for each construct is greater than 0.70

(Nunnally, 1994). Convergent validity assessed by Average Variance Extracted (AVE) for all constructs exceeded the cut off value of 0.50. Discriminant validity was confirmed as the square root of AVE for all constructs is greater than all their corresponding correlations as suggested by Fornell and Larcker (1981). Therefore, all the constructs indicate high internal consistency reliability, convergent validity and discriminant validity (see Table 2). We also tested the statistical procedures for CMB in our model by comparing the original CFA model and the CFA model with the latent model factor (Podsakoff et al., 2012). The model fit results of the latent model factor were not much different with the original CFA (Chi-square = 555.625, df = 162, CFI = 0.972, TLI = 0.964, RMSEA = 0.058, SRMR = 0.051), indicating that our model results were not affected by CMB. Finally, using the composite scores of each construct (i.e., mean score), we tested the presence of heteroskedasticity using Daryanto (2020)'s Heteroskedasticity test macro version 3. The Breusch-Pagan test results were significant ($p < 0.001$) indicating that heteroskedasticity was present in the data. To deal with the potential of the heteroskedasticity problem, we used the robust standard errors HC4 variant – which performs well for small samples and non-normal errors (Cribari-Neto, 2004) to adjust the standard errors of the regression coefficients.

We present the correlations amongst the constructs, means and standard deviation in Table 2. Both environmental knowledge and anxiety over land and forest fire were significantly and positively correlated with purchase intention towards certified palm oil products. Anxiety over land and forest fire and purchase intention towards certified palm oil products were significantly and positively correlated ($r = 0.55$ and $r = 0.57$, $p = < 0.01$, respectively). Moreover, environmental knowledge and anxiety over land and forest fire also were significantly and positively correlated ($r = 0.48$, $p = < 0.01$).

Table 1 Measurement items for the hypotheses testing of anxiety, environmental knowledge and purchase intention (H1 and H2)

	Constructs	SL (First-order)	SL (Second-order)
	Anxiety over land and forest fire (*Concern for welfare* α*= 0.97*)		
01	I'm concerned many companies in my region may relocate their business because of the effect of land and forest fire	0.94	0.94
02	I'm worried offices and stores will shut down because of the effect of land and forest fire	0.92	0.92
03	I'm worried I will receive less income because of the effect of land and forest fire	0.93	0.93
04	I'm worried I will lose all my possessions because of the effect of land and forest fire	0.92	0.93
05	I'm afraid I will spend more money for my daily transportation because of the effect of land and forest fire	0.94	0.93
	Anxiety over land and forest fire (*Concern for wellness* α*= 0.97*)		
01	I'm worried I will have long term health problems because of the effect of land and forest fire	0.94	0.94
02	I'm afraid I will have lung cancer because of the effect of land and forest fire	0.94	0.94
03	I'm concerned about my respiratory problems which cause difficulty to breathe because of the effect of land and forest fire	0.95	0.93
04	I'm scared my family get sick because of the effect of land and forest fire	0.95	0.95
05	I'm afraid my family will suffer the most because of the effect of land and forest fire	0.95	0.90
	Purchase intention towards certified palm oil products (α*= 0.95*)		
01	I intend to purchase certified palm oil products	0.95	0.95
02	I plan to purchase certified palm oil products	0.95	0.94
03	I will purchase certified palm oil products in my next purchase	0.98	0.93
04	I will purchase certified palm oil products in the future	0.96	0.90

	Constructs	SL (First-order)	SL (Second-order)
	Environmental knowledge *(α= 0.96*)		
01	I know about certified palm oil products	0.96	0.94
02	I am familiar with certified palm oil products	0.94	0.93
03	I feel knowledgeable about certified palm oil products	0.94	0.93

SL = standardized loadings

Table 2 Psychometric measures and correlations among the main constructs for H1 and H2

Construct	M	SD	AVE	CR	1	2	3
1. Anxiety	5.51	1.17	0.87	0.98	**0.93**		
2. PI	4.58	1.33	0.86	0.96	0.55**	**0.92**	
3. KNW	4.23	1.60	0.87	0.95	0.48**	0.57**	**0.93**

M = mean, SD = standard deviation, AVE = average variance extracted, square root of AVEs are in bold in main diagonal, CR = composite reliability, Anxiety = disaster anxiety over land and forest fire, PI = purchase intention towards certified palm oil products, KNW = environmental knowledge, sample size n = 502, **p < 0.01

3.1.4 Regression analysis

To test our hypotheses, we conducted regression analysis using the R package lavaan (Rosseel, 2012). The results showed that the relationship between anxiety and purchase intention towards certified palm oil products is positive and significant (b = 0.355, $p < 0.001$), in support of H1. The relationship between environmental knowledge and purchase intention towards certified palm oil products was also significant (b = 0.563, $p < 0.001$), in support of H2. The regression results are shown in Table 3.

3.1.5 Control variables

We included consumer characteristics such as gender, income, education, and age as control variables. Previous studies have indicated that these demographic factors affect purchase behavior towards environmentally friendly products (Paul and Rana, 2012; Wang et al., 2019). Past studies show that females are likely to be more sensitive and aware about environmental issues than males (Fischer and Arnold, 1994), and are more willing to act on environmental protection behavior than males (Wang et al., 2019). Past studies also show that consumers with high income are more willing to purchase environmentally friendly products even when such products are more expensive (Hinkes and Christoph-Schulz, 2020; Loureiro and Lotade, 2005). With respect to education, highly educated consumers are found to be more responsible for purchase decisions in favor of environmentally friendly products than lowly educated consumers (Witek and Kuźniar, 2020). With respect to age, some studies suggest that younger consumers are more sensitive to environmental issues than older consumers (Akehurst et al., 2012; D'Souza et al., 2007), and act accordingly to tackle the environmental issues (Wang et al., 2019). We found that only income had a significant positive relationship with purchase intention towards certified palm oil products ($b = 0.058$, $p < 0.05$), whereas gender, education and age were not significant (see Table 3).

Table 3 Regression results of H1 and H2

Relationship	Coefficient	*p*-value	Conclusion
Main effects:			
Anxiety → PI	0.355	0.000	**H1** Supported
KNW → PI	0.563	0.000	**H2** Supported
Control variables:			
GENDER → PI	0.026	0.365	
INC → PI	0.058	0.025	
EDU → PI	-0.017	0.527	
AGE → PI	0.001	0.734	

Sample size n = 502, Anxiety = disaster anxiety over land and forest fire, KNW = environmental knowledge, PI = Purchase intention towards certified palm oil products, GENDER = gender, INC = income, EDU = education, AGE = age

3.2 The mediating effect of attitude towards certified palm oil products (H3 and H4)

3.2.1 Sample and data collection

The data collection procedure and location were identical to the previous data collection. In total, 538 participants completed the survey. We deleted 11 participants from the data set because they were considered outliers (their responses on attitude towards certified palm oil products are above 2.5 standard deviations). We included 527 valid responses in the final data. The respondents were 52.8% female, more than 50% of respondents had a bachelor degree or above, and 46.5% had full-time employment.

3.2.2 Measures

The research design and measures were the same as in the previous data collection except we added a mediator variable in H3 and H4. We adapted the three-items scale by McCarty and Shrum (1994) to measure consumers' attitude towards certified palm oil products (e.g., "I believe that certified palm oil products help to save forest and its resources"). We used a Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

3.2.3 Measurement models

We conducted a CFA using the R package lavaan (Rosseel, 2012) to assess the reliability and validity of our constructs by treating anxiety over land and forest fire as a second-order factor. Similar with the previous data analysis, we also included the loading factors of the first-order and second-order factors. In our CFA analysis, all the loadings were greater than 0.63, except for item WLF1 (concern for welfare1) (see Table 4). We removed WLF1 as the loading was below the threshold value of 0.50 (Hair et al., 2010). The CFA results showed that the CFA model achieved an acceptable fit to the data (Chi-square = 555.839, df = 208, CFI = 0.965, TLI = 0.958, RMSEA = 0.056, SRMR = 0.057). We also checked the internal consistency reliability, convergent validity and discriminant validity of all main constructs. The Cronbach alpha was more than 0.80 (Hair et al., 2010), the CR for each scale was greater than 0.70 (Nunnally, 1994), the AVE for all constructs surpassed 0.50 and the square root of AVE for all constructs was greater than all their corresponding correlations (Fornell and Larcker, 1981). Thus, all the constructs show high internal consistency reliability, convergent validity and discriminant validity (see Table 5). We also conducted similar procedures for CMB (Podsakoff et al., 2012).

The model fit results of the latent model factor were not much different than the original CFA (Chi-square = 533.018, df = 194, CFI = 0.966, TLI = 0.956, RMSEA = 0.058, SRMR =

0.051), suggesting CMB was not a threat to the measurement validity of the model. Lastly, using the mean scores of each construct, we also examined the heteroskedasticity using Breusch-Pagan test (Daryanto, 2020). The results were significant ($p < 0.001$), indicating that heteroskedasticity was present in the data. Following this result, we used the robust standard errors HC4 variant to adjust the standard errors of the regression coefficients.

We present the correlations among the constructs, means and standard deviation in Table 5. Attitude towards certified palm oil products, purchase intention towards certified palm oil products and environmental knowledge were significantly and positively correlated with anxiety over land and forest fire ($r = 0.36$, $r = 0.37$, $r = 0.29$, respectively, $p = < 0.01$). Both purchase intention towards certified palm oil products and environmental knowledge were significantly and positively correlated with attitude towards certified palm oil products ($r = 0.65$, $r = 0.39$, $p = < 0.01$). Finally, environmental knowledge had a significant and positive correlation with purchase intention towards certified palm oil products ($r = 0.47$, $p = < 0.01$).

Table 4 Measurement items for the hypotheses testing of the mediating effect of attitude (H3 and H4)

	Constructs	SL (First-order)	SL (Second-order)
	Anxiety over land and forest fire (*Concern for welfare, α= 0.88*)		
01	I'm worried offices and stores will shut down because of the effect of land and forest fire	0.73	0.74
02	I'm worried I will receive less income because of the effect of land and forest fire	0.89	0.89
03	I'm worried I will lose all my possessions because of the effect of land and forest fire	0.78	0.78
04	I'm afraid I will spend more money for my daily transportation because of the effect of land and forest fire	0.76	0.76

	Constructs	SL (First-order)	SL (Second-order)
	Anxiety over land and forest fire (*Concern for wellness, α= 0.94*)		
01	I'm worried I will have long term health problems because of the effect of land and forest fire	0.90	0.90
02	I'm afraid I will have lung cancer because of the effect of land and forest fire	0.85	0.85
03	I'm concerned about my respiratory problems which cause difficulty to breathe because of the effect of land and forest fire	0.87	0.87
04	I'm scared my family get sick because of the effect of land and forest fire	0.87	0.87
05	I'm afraid my family will suffer the most because of the effect of land and forest fire	0.88	0.88
	Attitude towards certified palm oil products (*α= 0.89*)		
01	I believe that certified palm oil products help to reduce land and forest fire	0.71	0.70
02	I believe that certified palm oil products help to save forest and its resources	0.76	0.76
03	Given a choice, I will prefer certified palm oil products over conventional products	0.89	0.89
	Purchase intention towards certified palm oil products (*α= 0.95*)		
01	I intend to purchase certified palm oil products	0.92	0.92
02	I plan to purchase certified palm oil products	0.94	0.94
03	I will purchase certified palm oil products in my next purchase	0.93	0.93
04	I will purchase certified palm oil products in the future	0.88	0.87
	Environmental knowledge (*α= 0.92*)		
01	I know about certified palm oil products	0.92	0.92
02	I am familiar with certified palm oil products	0.87	0.88

	Constructs	SL (First-order)	SL (Second-order)
03	I feel knowledgeable about certified palm oil products	0.87	0.87

SL = standardized loadings

Table 5 Psychometric measures and correlations among the main constructs (H3 and H4)

Construct	M	SD	AVE	CR	1	2	3	4
1. Anxiety	5.60	0.86	0.70	0.95	**0.83**			
2. ATT	4.99	1.14	0.62	0.83	0.36**	**0.78**		
3. PI	5.07	1.12	0.83	0.94	0.37**	0.65**	**0.91**	
4. KNW	4.34	1.38	0.79	0.91	0.29**	0.39**	0.47**	**0.88**

M = mean, SD = standard deviation, AVE = average variance extracted, square root of AVEs are in bold in main diagonal, CR = composite reliability, Anxiety = disaster anxiety over land and forest fire, ATT = attitude towards certified palm oil products, PI = purchase intention towards certified palm oil products, KNW = environmental knowledge, sample size n = 527, **p < 0.01

3.2.4 Analysis of the structural model

To test our hypotheses, we conducted structural equation modelling using the R package lavaan (Rosseel, 2012). We also tested our hypotheses by examining the significance of the path coefficients and their bootstrap confidence intervals. We performed 5000 bootstrap samples to measure the significance of the relationships. The results indicated a significant total effect i.e., the sum of indirect and direct effects (Hair et al., 2017) of both the anxiety over land and forest fire and environmental knowledge on purchase intention towards certified palm oil products (b = 0.625, p < 0.001). The results further demonstrated a positive and significant indirect effect of anxiety over land and forest fire on purchase intention towards certified palm oil products via attitude towards certified palm oil products (b = 0.409, p < 0.01), in support of H3. The results also showed a positive and significant indirect effect of environmental knowledge on purchase intention towards certified palm oil products via attitude towards certified palm oil products (b = 0.215, p < 0.01), in support of H4. The positive indirect effect means that the attitude towards certified palm oil products explained the relationships of both the anxiety over

land and forest fire and environmental knowledge on purchase intention towards certified palm oil products.

Furthermore, the direct relationship between anxiety over land and forest fire and purchase intention towards certified palm oil products became not significant (b = -0.033, p > 0.05), while the direct effect of environmental knowledge on purchase intention towards certified palm oil products was still significant (b = 0.257, p < 0.01). This means that the relationship between anxiety over land and forest fire and purchase intention towards certified palm oil products was fully mediated by attitude towards certified palm oil products, whereas the relationship between environmental knowledge and purchase intention towards certified palm oil products was partially mediated by attitude towards certified palm oil products. Turning to the control variables, we found the same findings, i.e., income had a significant and positive effect on purchase intention towards certified palm oil products (b = 0.142, p < 0.001), but none of the other control variables i.e., gender, education and age, was significant on purchase intention towards certified palm oil products. All regression results are reported in Table 6.

Table 6 Structural model results (H3 and H4)

Relationship	Coefficient	*p*-value	95% Confidence interval bias corrected		Conclusion
			LL	UL	
Total effect:					
Anxiety + KNW → PI	0.625	0.000	0.355	1.373	
Indirect effects:					
Anxiety → ATT → PI	0.409	0.007	0.065	1.187	**H3** Supported
KNW → ATT → PI	0.215	0.001	0.087	0.306	**H4** Supported
Direct effects:					
Anxiety → ATT	0.489	0.004	0.062	1.058	
KNW → ATT	0.257	0.001	0.082	0.289	

ATT → PI	0.838	0.000	0.887	1.257
Anxiety → PI	-0.033	0.609	-0.304	0.147
KNW → PI	0.151	0.000	0.061	0.192
Control variables:				
GENDER → PI	-0.042	0.114	-0.217	0.021
INC →PI	0.142	0.000	0.226	0.528
EDU →PI	0.003	0.905	-0.152	0.168
AGE → PI	0.004	0.122	-0.001	0.011

Sample size n = 527, Bootstrap samples n = 5000, LL = 95% lower limit, UL = 95% upper limit, Anxiety = disaster anxiety over land and forest fire, ATT = attitude towards certified palm oil products, KNW = environmental knowledge, PI = purchase intention towards certified palm oil products, GENDER = gender, INC = income, EDU = education, AGE = age

4 Discussions and implications

The purpose of this research is to assess how anxiety over land and forest fire and environmental knowledge could have impact on purchase intention towards certified palm oil products. To test H1 and H2, we assessed the relationship between anxiety over land and forest fire, environmental knowledge and purchase intention towards certified palm oil products to test H3 and H4, we examined whether attitude towards certified palm oil products mediate the relationships.

The results of our hypotheses testing show that anxiety over land and forest fire has a positive relationship on certified palm oil consumption. These results confirm the findings of Harth et al. (2013) that suggest consumers' emotion could influence sustainable consumption. Similar findings of Gregory-Smith et al. (2013)'s study find that emotional factors such as guilt, pride and anxiety affect consumers' decisions on sustainable consumption choices. Our

study also shows that environmental knowledge has a positive relationship on certified palm oil consumption. While some studies suggest that environmental knowledge affects purchase intention towards environmentally friendly products (Polonsky et al., 2012; Thøgersen et al., 2010), some other studies show no significant effect (Asvatourian et al., 2018; Kumar et al., 2017). The difference between our study and these studies is that our respondents are the residents of forest fire prone areas, moreover they reside in developing country. We show that the more knowledgeable they are about certified palm oil products, the higher their purchase intention towards certified palm oil products.

The results of our subsequent hypotheses testing show that attitude towards certified palm oil products fully mediates the relationship between anxiety over land and forest fire and purchase intention towards certified palm oil products. Anxiety over land and forest fire is an emotion that is experienced by residents who live in a forest fire prone area. Emotion is a physiological reaction which can form behavioral actions (Martin et al., 2008). Emotion is complex, and could result in approval or refusal of responsibilities (Kashi, 2019). Past research found that environmental problems might cause emotional distress that could lead to non-environmentally friendly behavior (Kollmuss and Agyeman, 2002), while other research discovered that negative emotions could lead to pro-environmental behavior (Harth et al., 2013). Our result confirms that emotions shape environmental attitudes which in turn influence pro-environmental actions (Kollmuss and Agyeman, 2002). We show that emotion in the form of residents' anxiety over land and forest fire shapes the residents' attitude towards certified palm oil products, and this attitude fully explains the association between their anxiety and purchase intention towards certified palm oil products.

Our study also shows that attitude towards certified palm oil products mediates the relationship between environmental knowledge and purchase intention towards certified palm oil products, but this time it is a partial mediation. This means that environmental knowledge

both directly and indirectly via attitude affect the purchase intention towards certified palm oil products. This finding is in line with Schwartz's (1976) knowledge, attitude, and practice (KAP) model that was developed in the health context and has been used in other contexts including environmental behavior (e.g., Manika et al., 2021; Wang et al., 2013). For consumers to make environmentally responsible purchases, they need to be aware of the environmental issues and the impact that they will make when purchasing the environmentally friendly products (Taufique et al., 2017). Moreover, consumers' knowledge develops their attitude towards certain behavior (Dhir et al., 2021). These suggest the importance of knowledge-driven methods to influence purchase intention towards certified palm oil products.

Our research makes the following contributions to the existing palm oil consumption literature. Among several studies that discuss palm oil consumption, anxiety over land and forest fire has never been examined as a factor that can trigger consumers to purchase certified palm oil products. This research fills the knowledge gap by showing that anxiety over land and forest fire as an emotional factor may motivate consumers to purchase certified palm oil products. In general, our research emphasizes the work of prior studies which show that emotion plays an important role in environmental actions (Ferguson and Branscombe, 2010; Harth et al., 2013). Moreover, in our research, we used different research samples, which focus on residents who are from the palm oil producing country and live near the forest fire prone areas. Another specific contribution to the palm oil consumption literature is that we present that attitude towards certified palm oil products could explain the link between anxiety over land and forest fire and purchase intention towards certified palm oil products. The rationale is that when these residents have certain levels of anxiety over land and forest fire, they are likely to engage in environmental actions by purchasing certified palm oil products to protect the environment. We also show that residents who have environmental knowledge are likely to have more intention to purchase certified palm oil products.

The findings of this study have significant implications for the palm oil industry. Emotional factors such as anxiety over land and forest fire potentially boosts attitude towards certified palm oil products and purchase intention. In addition, knowledge about certified palm oil products influences the residents' purchase intention. Findings from this research could assist government to implement sustainable palm oil policies for all palm oil goods. Government entities should support responsible behaviors for residents by informing residents about certified palm oil products and encouraging them to buy certified palm oil products in a way that the residents' actions will decrease the impact of forest fire. Highlighting the benefit of certified palm oil products may be a worthwhile strategy to achieve sustainable behaviors. This research also demonstrates that consumers might engage in environmental behaviors to manage their anxiety over land and forest fire. Our results could be used to inform palm oil companies to support consumers to purchase certified palm oil products by creating a campaign for certified palm oil products as a way to mitigate land and forest fire.

5 Limitations and further research

Our study has several limitations. First, our data are limited to Sumatera and Kalimantan provinces in Indonesia. Further research should consider the possibility of a broader setting and bigger sample i.e., in other cities or countries that have palm oil plantations. Second, our research focuses on how anxiety over land forest fire as an emotion influences purchase intention towards certified palm oil products. Future work might examine other types of both positive and negative emotions i.e., respect and guilt that could influence purchase intention (Wang and Wu, 2016). This could provide new insights into the relationship between emotion and purchase intention of environmentally sustainable products. Finally, the present study used consumers' characteristics i.e., gender, income, education and age as control variables, and

found that only income matters in explaining purchase intention towards certified palm oil products. Additional variables (e.g., past ecolabel use) could be used as control variables.

6 Conclusion

Many of the palm oil consumption studies tend to neglect the impact of emotion on consumption choices. This research contributes to a better understanding on how anxiety over land and forest fire, as a form of emotion, influences purchase intention towards certified palm oil products. First, our results contribute to the palm oil consumption literature. Our findings suggest together with environmental knowledge as a cognitive factor, anxiety over land and forest fire as an emotional factor play a major role on purchase intention towards certified palm oil products. The findings of this study have implications for government and marketers. Government needs to disseminate information about certified palm oil products and promote sustainable behaviors by advising consumers to purchase certified palm oil products in order to reduce the impact of deforestation and forest fire, and to encourage companies to apply for and use certified palm oil in all palm oil-based food products to support food sustainability concern. It is also important for marketers to raise environmental awareness for consumers by creating certified palm oil campaigns.

CHAPTER 4

Do Government's Normative Vertical Power and Perceived Source Credibility Influence Warning Message Compliance Intention? The Moderating Role of Anxiety over Land and Forest Fire

Abstract

In this research, we study how residents comply with warning messages on potential land and forest fire disaster communicated by their government. Specifically, we examine the relationship between normative vertical power mapped onto perceived subjective norm, perceived source credibility and message compliance intention. In doing so, we introduce anxiety over land and forest fire as an emotional factor that moderates the relationship between perceived subjective norm and perceived source credibility on message compliance intention. We demonstrate that perceived subjective norm has a positive impact on message compliance intention. Further, our study reveals that the relationship between perceived subjective norm and message compliance intention becomes weaker as anxiety over land and forest fires increases. We also find that perceived source credibility has no impact on message compliance intention, and anxiety over land and forest fire do not moderate the relationship between perceived source credibility and message compliance intention. Our research contributes to literature on warning message compliance and presents important policy implication for government.

Keywords: Normative vertical power, anxiety over land and forest fire, message compliance, Indonesia.

1 Introduction

Land and forest fire disasters have become increasingly prevalent over the years. It is one of the most life threatening situations causing serious casualties, loss of property and environmental disruption (Kolaitis et al., 2011). For examples, one of the deadliest wildfires in Victoria, Australia burnt 450,000 ha and caused 173 fatalities (Ribeiro et al., 2020), in California, USA, extreme wildfires in 2018 burnt 153,000 ha and caused 85 fatalities (Vazquez et al., 2022). Not only does land and forest fire create physical loss, but it also prompts mental health problems such as anxiety (Kolaitis et al., 2011). Indonesia is one of the countries that has annual land and forest fire. This land and forest fire is concerning because the trend is increasing every year (Field et al., 2016). During 2015 – 2021, almost 6 million ha area was burnt in Indonesia (KLHK, 2022) which mostly occurs in Sumatera and Kalimantan islands. In an attempt to reduce the impact of land and forest fire disasters, Indonesian government has disseminated early warning messages (e.g., via short message service) for land and forest fire since 2018 targeted at residents who live in disaster prone areas in the above islands (KLHK, 2018). These early warning messages are implemented to alert the residents of the impending disaster and communicate about the risks and appropriate measures.

In recent years, scholars have begun studying the effectiveness of warning messages and the importance of perceived subjective norm and source credibility has begun to emerge (De Meulenaer et al., 2018; Han et al., 2015; Kang and Namkung, 2019). In particular, a limited number of studies have shown that these two factors matter in the context of influencing people's compliance with warning messages. While this research provides an initial insight into the role of these two predictors in influencing people's compliance, understanding the boundary condition of these two factors is lacking. Furthermore, research has not yet considered how the emotional factor of anxiety can act as the moderator variable of the relationship between these two factors and warning message compliance. The goal of our

research is to fill the knowledge gap by examining the relationship among perceived subjective norm, perceived source credibility, message compliance, and anxiety as a moderating factor. Specifically, we suggest that subjective norm and source credibility have a positive impact on warning message compliance which is contingent on anxiety over land and forest fire. By examining these hypotheses, we aim to make the following contributions.

First, we replicate and extend the emerging literature of perceived subjective norm, perceived source credibility and message compliance. Although the relationship exists, the magnitude of the relationship is not yet known in the context of Indonesia. Indonesia is an interesting research context due to the frequency of exposure to land and forest fire and it is a collectivist country where perceived subjective norm is culturally influential (Smith, 2015). Second, our study examines how perceived subjective norm and perceived source credibility as cognitive factors and anxiety over land and forest fire as an emotional factor could simultaneously influence message compliance intention. Prior research on message compliance has focused on two main research issues. One group of studies examine the role of cognitive factors in affecting message compliance intention e.g. perceived subjective norm and perceived source credibility (Fish et al., 2017; Mayhorn and McLaughlin, 2014). Another group of studies discuss the role of emotions in influencing message compliance intention e.g., fear and anger (DeYoung et al., 2019; Liu et al., 2017). However, both cognitive and emotional factors have not been examined in the same study. Our research fills the gap by examining the joint effect of cognitive and emotional factors in a land and forest fire context, which has been overlooked in previous research. Third, our research measures residents perceived subjective norm that serves as a proxy of the residents' perception regarding the normative vertical power of the government and examines how this affects message compliance. Perceived subjective norm has been studied as an antecedent of message compliance in the context of non-governmental institution-actors relationship (e.g., schools-students, hospitals-patients, companies-

employees) (De Meulenaer et al., 2018; Han et al., 2015; Vermeulen, 2014). We adopt Etzioni's compliance theory, which views government as a formal agentic organization that consists of rules and structures (Meyer et al., 2006), and possesses normative vertical power which can be mapped onto perceived subjective norm (Han et al., 2015) to examine message compliance in the context of governmental institution-residents relationship.

This paper is organized as follows. In the next section, we explain the relevant literature and formulate our hypotheses. Next, we develop our research model, present our methodology, and discuss our findings. Finally, we present the implications of our findings, and conclude our research.

2 Literature review and hypotheses

2.1 Normative vertical power

Etzioni's compliance theory has been commonly used in research on organizations (Etzioni, 1961). The theory focuses around the concept of compliance. This theory views compliance as the relationship between the superiors who have power in an organization and the subordinates who are subjected to that power (Etzioni, 1961); how the superiors can control the subordinates based on physical, material and symbolic power (Etzioni and Lehman, 1980). Compliance theory distinguishes the aforementioned power as coercive, remunerative and normative. The coercive power uses physical sanction to control the subordinates such as restriction of movement; while in remunerative power, the superiors utilize rewards or material sources such as salaries and commissions (Etzioni, 1961). In normative power, the superiors control the subordinates through symbolic rewards such as contribution to society, ideas and esteem and prestige symbols (Etzioni, 1961). Normative power can be classified into normative vertical power which comprises vertical relationships between people who have different status levels such as government and citizens, leaders and followers, teachers and students; and normative

horizontal power which includes the horizontal relationships between those who have equal status levels such as between friends, peers, or colleagues (Etzioni and Lehman, 1980).

Etzioni's compliance theory explores the power that influences members' compliance behavior in an organization (Etzioni, 1961). This power could be employed by organizational representatives to control their members in a favourable way (Dodge, 2016) and the success of compliance depends on the extent of power (Han et al., 2015). Despite several forms of power being implemented in an organization, there will be one form of power that dominates in an organization. According to Han et al. (2015), it is normative power that is more prevalent in an organization compared to coercive and remunerative power.

In this study, we adopt Etzioni's compliance theory. We focus on normative power, particularly on normative vertical power because we want to examine the vertical relationship between the government and residents in the areas that are prone to land and forest fire. Government is an authority that has control over public policy particularly in the event of disaster (Chatfield et al., 2013). Previous research has mapped normative vertical power to perceived subjective norm (Han et al., 2015). Thus, in our study we also refer normative vertical power to perceived subjective norm. We argue that residents' compliance to the land and forest fire warning messages is related to perceived subjective norm. The perceived subjective norm can be seen as a normative belief which suggests that people's intention to perform specific behaviors are influenced by their belief of what important others expect them to do in a situation (Ajzen, 1985). Hence, when the government alerts the residents about the potential land and forest fire, the residents who are attached to the government may feel pressure to comply with the government instructions or commands.

The residents are expected to comply with the government's rules and policies including the early warning messages in an emergency situation. Compliance as a response to a warning message is either an immediate compliance or a delayed compliance (Han et al., 2011). The

warning message is designed to protect the residents from the impact of disasters. Some residents may be more motivated to follow the instructions in the warning message than others (Dow and Cutter, 2000). Government cannot threat the residents who do not comply with the warning messages with physical or material sanctions as they are already experiencing the physical and material threats from the disaster itself. What government can do is to use their normative power over the residents to persuade them to comply with the warning messages. In a land and forest fire disaster, residents' intention to comply with the warning messages might be influenced by their expectations of the government as an entity that has the authority to control the residents with their rules. We therefore hypothesize:

Hypothesis 1. Perceived subjective norm is positively related to warning message compliance intention.

2.2 Perceived source credibility

Providing a warning message to potential victims of disaster to alert them about the impending disaster is an essential task as the warning message can help them to understand the situation (Yoo et al., 2021). However, the warning messages should come from a credible source, otherwise people may pay less attention to the warning (Mayhorn and McLaughlin, 2014). Perceived source credibility refers to the level of trust a message recipient has for a sender, in which the judgment made about a message is influenced by the attitude towards the message source (Wu and Wang, 2011). Perceived source credibility has been found to influence message recipients' attitudes and behavioral intention (Yoo and Gretzel, 2011).

In disaster, perceived source credibility plays a critical role in decision making. It affects how people will react after they receive the warning messages. When people receive a warning message, they will first judge the validity of the source before deciding whether to verify and respond to the warning messages (Mayhorn and McLaughlin, 2014). The warning messages

may come from the government, friends or colleagues (Lindell and Perry, 2003). There is evidence demonstrating that higher perceived source credibility is likely to influence warning message compliance (e.g., Mayhorn and McLaughlin, 2014; Umeh, 2012). If a warning message comes from a reputable and valid source as perceived by the recipients, it will make the warning message more credible and increase the message compliance intention (Wogalter et al., 1999).

Land and forest fire disaster is not like other natural disasters; the way residents respond to land and forest fire threat is complex and depends on several factors (McLennan et al., 2019). The decision making complexity comes from the proximity of the fire and the potential devastation from the fire (Dickinson et al., 2020). Some residents are likely to stay at their houses and defend their properties, or wait and see the spread of the fire before making their decisions (McLennan et al., 2019). Recommendations and directions from credible authorities can improve compliance (De Meulenaer et al., 2018). When the residents perceive the source of the warning message is credible, they have more confidence in the warning message – the information on what is happening in a current situation and what they have to do to reduce the impacts of land and forest fire. The residents are likely to follow the recommended coping response if they believe the warning message comes from credible sources (Mileti and Fitzpatrick, 1992).

To summarize, we argue that perceived source credibility will affect warning message compliance intention. If the residents believe the warning message is sent out from a credible source, they are likely to comply with the warning messages. This leads us to the following hypothesis:

Hypothesis 2. Perceived source credibility is positively related to warning message compliance intention.

2.3 Anxiety over land and forest fire

Emotions play a major part in understanding disaster and planned actions related to disaster (DeYoung et al., 2019). A growing amount of literature has considered the effect of emotions in explaining judgments and decision making (Peters et al., 2006). Past studies revealed that the negative emotions that people experience during disaster are closely intertwined with coping response behavior (Sutton et al., 2018). Anxiety is described as an unpleasant emotion from a crisis condition (Lazarus, 1991). Anxiety is found to be one of the most dominant emotions when people experience a stressful condition (Jin, 2009). Anxiety can affect people, particularly for those who frequently face an emergency situation such as disasters. Land and forest fire is one of the disasters that pose a threat to human life, property and environment (Vazquez et al., 2022; Zhang et al., 2018). The land and forest fire may trigger emotional distress and anxiety among residents who live near the forest fire prone areas (Eisenman et al., 2015). As a consequence, residents may also experience some physical changes e.g., headache and fatigue (van den Berg et al., 2005) or sleep problems (Geng et al., 2018).

Besides having some negative consequences on the residents' psychological and physical conditions, anxiety could play an important part in shaping residents' response behavior (Mishra and Suar, 2012). Past studies generally agreed that anxiety was related to message compliance intention (Jin et al., 2016; Peters et al., 2006). A study by Wirtz et al. (2019) found that anxiety has a positive relationship on protective measures. A study by Rüstemli and Karanci (1999) in the context of an earthquake showed that anxiety/fear is positively linked with a higher level of precautionary behaviors among the earthquake victims. In addition, it was shown that the feelings of anxiety could help people to manage their feelings and mobilize people to cope with stressful situations (Kemp et al., 2021). Although some studies demonstrated that anxiety has negative association with coping responses (e.g., Bodas et al.,

2017), they have also shown that anxiety could lower the risk acceptance in catastrophic events (Paton, 2003).

People who experience anxiety choose their own precautionary behavior in the event of a disaster which depends on their level of disaster anxiety (Jin, 2009). One of the precautionary behaviors is to evacuate immediately. We previously argued that in land and forest fire disaster, residents' compliance with warning messages may be affected by the perceived subjective norm, i.e., what the government want residents to do in an emergency situation (Han et al., 2015). As the residents' intention to comply to warning messages could also be influenced by the feelings of anxiety (Lerner and Keltner, 2000), we argue that higher level of anxiety could increase the likelihood of complying with the warning messages. When the level of anxiety is lower, they are less likely to comply with the warning messages (Paton, 2003), however the perceived subjective norm from the government may persuade them to comply. Therefore, we hypothesize:

Hypothesis 3. The relationship between perceived subjective norm and warning message compliance intention will become weaker as anxiety over land and forest fire increases.

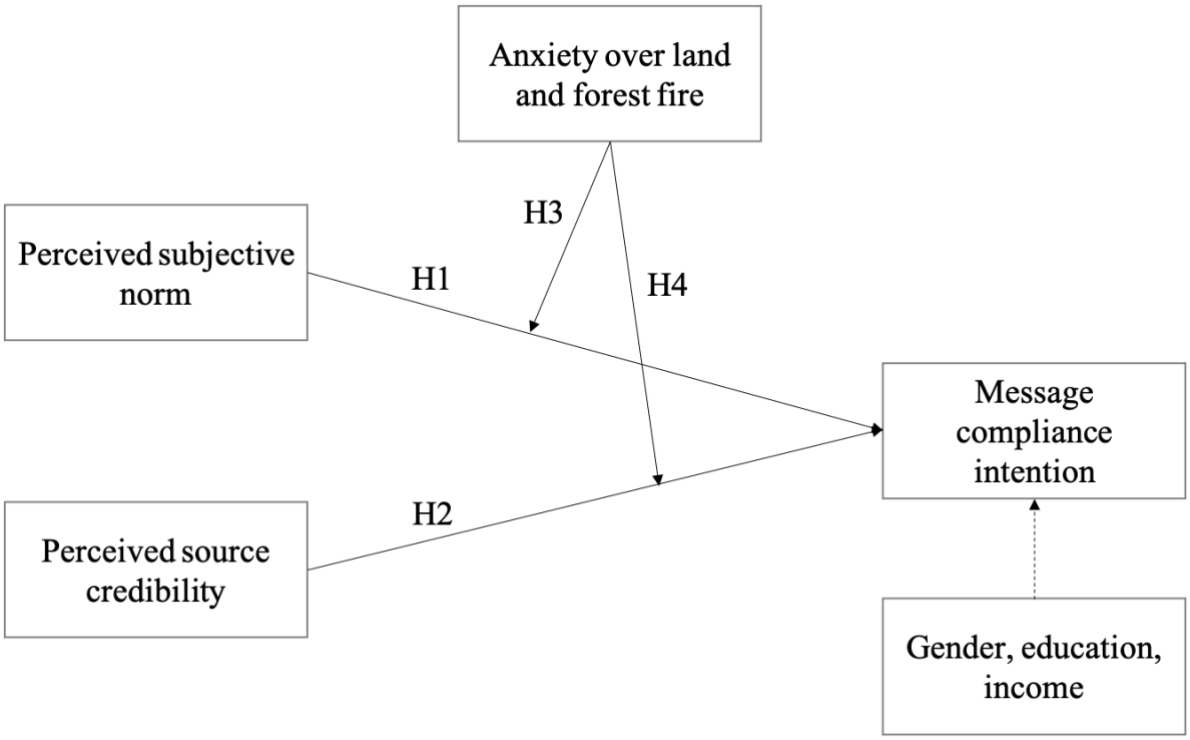
Past studies have shown that perceived source credibility could motivate and persuade people to engage in an expected manner (Wogalter et al., 1999; Yoo and Gretzel, 2011). Mayhorn and McLaughlin (2014) showed that with respect to warning messages, a credible source is likely to be more persuasive in motivating people to comply with the warning messages. The relationship between perceived source credibility and warning message compliance could be influenced by emotion (Pornpitakpan, 2004). The way people perceive the credibility of the message sources can vary based on their emotion level which in turn influences their coping responses, such as immediate compliance to the warning messages (Yoo et al., 2021).

We argue that for residents who have higher levels of anxiety over land and forest fire, the anxiety over land and forest fire itself is adequate to make them immediately comply with the warning messages regardless of their perceived message source credibility. The relationship between perceived source credibility and message compliance intention is more pronounced when the residents have lower levels of anxiety. Accordingly, we hypothesize:

Hypothesis 4. The relationship between perceived source credibility and warning message compliance intention will become weaker as anxiety over land and forest fire increases.

Our conceptual model is depicted in Figure 1.

Figure 1. Conceptual model



3 Methodology

Our research setting is Indonesia. Land and forest fire is one of the most frequent disasters in Indonesia that happens mostly in Sumatera and Kalimantan islands. Thus, our targeted participants are local residents in Sumatera and Kalimantan who are affected by the fire. A warning message is sent to alert residents to prepare emergency events related to the land and forest fire disaster. In this study, the participants were presented with a scenario of warning messages in the event of forest fire (see Figure A.1 of Appendix A).

3.1 Sample and data collection

We developed a survey to test the relationships in our research model. Before the actual data collection, the survey was proofread and pretested with five individuals who are residents in Sumatera and Kalimantan to check whether they could understand the questions accurately. Several survey adjustments were made based on their feedback. We collected data from an online survey sent to residents in several provinces in Sumatera (i.e., Jambi, Riau, and South Sumatera) and Kalimantan (i.e., South Kalimantan, West Kalimantan, North Kalimantan, East Kalimantan and Central Kalimantan). We sent a survey link to our targeted respondents. We also asked the survey respondents to forward the link to their friends and colleagues. We included a filter question to eliminate respondents who were not from our targeted areas. We also included a reality check question in the survey, “Do you think the warning message shown above is realistic?” If the participants chose no, their responses were excluded from the survey. In total, 651 completed samples were observed. Of the samples, 45.9% were male, 67.1% had a bachelor degree or above, and 47.5% had full-time employment.

3.2 Measures

We developed our survey items and applied a translation and back translation procedure to present the survey in Indonesian language. All items except message compliance intention were measured using a seven-point Likert scale, ranging from strongly disagree (1) to strongly agree (7). The first two survey items of message compliance intention were measured using a seven-point Likert scale ranging from very unlikely (1) to very likely (7), and the third one used reversed-coded items. We also inserted unrelated survey items and different scaling techniques to avoid common method bias in the data as recommended by Podsakoff et al. (2003). To measure perceived subjective norm, we used four items scale adapted from Ajzen (2002) and Han et al. (2015) (e.g., "The government would want me to comply with the message immediately in the event of forest fire"). Anxiety over land and forest fire was measured by employing a scale developed by Fatricia et al. (2023). The scale includes two dimensions i.e., concern for welfare (e.g., "I'm worried I will receive less income because of the effect of land and forest fire") and concern for wellness (e.g., "I'm scared my family will get sick because of the effect of land and forest fire"). We adapted the scale developed by Kang and Namkung (2019) to measure perceived source credibility which consists of three dimensions i.e., trustworthiness (e.g., "The information provided by the government is trustworthy"), expertness (e.g., "The government is qualified to give information"), and reputation (e.g., "The government has a good image"). We used three items scale adapted from Han et al. (2015) (e.g., "When I receive a warning message, I will comply immediately") to measure message compliance intention. We present our measurement items in Table 1.

3.3 Control variables

We included gender, education, and income as control variables. Females are likely to be associated with warning message compliance as they have higher intention to adopt proper

measures (Rahn et al., 2021). Education was chosen to be our control variable because past research showed that people who have high education tend to engage with precautionary behaviors to protect them and their households against potential crisis incidents (Bish and Michie, 2010; Reininger et al., 2013). Finally, income level might have an effect on the decisions to comply with emergency situation. Studies have shown that low income people are reluctant to evacuate when disaster occurs (Riad et al., 1999; Whitehead et al., 2000).

3.4 Measurement models

We measured the psychometric properties of each construct by conducting a confirmatory factor analysis (CFA) using the R package lavaan (Rosseel, 2012). We also examined discriminant and convergent validity of the construct. The CFA model indicates a good fit to the data (Chi-square = 692.591, df = 247, CFI = 0.976, TLI = 0.971, RMSEA = 0.053, SRMR = 0.038). The factor loadings of all indicators for the latent construct exceeded the benchmark of 0.5 (Bagozzi and Yi, 2012). Cronbach's alpha was greater than 0.70 (Hair et al., 2010) and the composite reliability (CR) of each construct surpassed the cut off value of 0.70 (Fornell and Larcker, 1981). We tested the convergent validity for each construct by assessing average variance extracted and the results show that all constructs exceeded the threshold of 0.50 (Fornell and Larcker, 1981). We examined the discriminant validity of each construct by measuring the square root of the AVE, and the result shows that the square root of AVE for all constructs was greater than all their corresponding correlations (Fornell and Larcker, 1981). Our results are presented in Table 2. Furthermore, we tested the statistical procedure for common method bias using a single unmeasured latent method factor (Podsakoff et al., 2003). The results reveal that the difference in goodness of fit between the CFA latent factor and the original model was not significant (Chi-square = 859.134, df = 241, CFI = 0.967, TLI = 0.959, RMSEA = 0.063, SRMR = 0.074), suggesting that common method bias is not a threat to our

model. Finally, using the mean scores of each construct, we tested the presence of heteroskedasticity using Daryanto (2020) Heteroskedasticity test macro version 3. The Breusch-Pagan test results were significant ($p < 0.001$) implying that heteroskedasticity was present in the data. Following this result, we used the robust standard errors HC4 variant to adjust the standard errors of the regression coefficients (Cribari-Neto, 2004).

Table 1. Measurement model

Constructs/Items	Loadings
Perceived Subjective norm (α= 0.94)	
The government would want me to comply with the message immediately in the event of forest fire	0.92
The government think I should obey the warning message in the event of forest fire	0.87
The government supports my action to comply with the warning message in the event of forest fire	0.92
The government considers complying with the warning message to be an appropriate step for me in the event of forest fire	0.88
Anxiety over land and forest fire (Concern for welfare) (α= 0.90)	
I'm concerned many companies in my region may relocate their business because of the effect of land and forest fire	0.73
I'm worried offices and stores will shut down because of the effect of land and forest fire	0.86
I'm worried I will receive less income because of the effect of land and forest fire	0.86
I'm worried I will lose all my possessions because of the effect of land and forest fire	0.74
I'm afraid I will spend more money for my daily transportation because of the effect of land and forest fire	0.86
Anxiety over land and forest fire (Concern for wellness) (α= 0.96)	
I'm worried I will have long term health problems because of the effect of land and forest fire	0.90
I'm afraid I will have lung cancer because of the effect of land and forest fire	0.84
I'm concerned about my respiratory problems which cause difficulty to breathe because of the effect of land and forest fire	0.93
I'm scared my family will get sick because of the effect of land and forest fire	0.94
I'm afraid my family will suffer the most because of the effect of land and forest fire	0.93
Perceived source credibility (trustworthiness) (α= 0.95)	
The information provided by the government is trustworthy	0.92
The information provided by the government is honest	0.92
The information provided by the government is accurate	0.97
Perceived source credibility (expertness) (α= 0.95)	
The government is qualified to give information	0.95
The government is an expert to give information	0.89

Constructs/Items	Loadings
The government is experienced to give information	0.92
Perceived source credibility (reputation) (α= 0.97)	
The government has a good reputation	0.97
The government has a good image	0.97
Message compliance intention (α= 0.73)	
When I receive a warning message, I will comply immediately*	0.91
When I receive a warning message, I will verify first and then comply*	0.80
When I receive a warning message**, I will ignore it	0.59

CR = Composite Reliability, α = Cronbach's Alpha, AVE = Average Variance Extract
*These items were measured using 7-point scale, where 1 = very unlikely and 7 = very likely
** This item was measured using 7-point scale reversed code, where 1 = very likely and 7 = very unlikely. CFA model fit: x^2 = 692.591; df = 247; CFI = 0.976; TLI = 0.971; RMSEA = 0.053; SRMR = 0.038

Table 2. Latent construct correlation

Constructs	Mean	SD	AVE	CR	1	2	3	4
1. ALF	5.44	0.86	0.74	0.96	**0.86**			
2. SN	5.42	0.98	0.80	0.94	0.58	**0.89**		
3. MCI	5.58	0.94	0.60	0.81	0.54	0.57	**0.77**	
4. SC	5.25	0.95	0.88	0.98	0.61	0.70	0.48	**0.93**

SD = Standard Deviation, AVE = Average Variance Extracted, square root of AVEs are in bold in main diagonal, CR = Composite Reliability, ALF = Anxiety over Land and Forest Fire, SN = Perceived Subjective norm, MCI = Message Compliance Intention, SC = Perceived Source Credibility, Sample Size n = 561

3.5 Results

We used a hierarchical regression to test our main and moderation hypotheses. We tested the main effect of perceived subjective norm (SN), perceived source credibility (SC) and anxiety over land and forest fire (ALF) on message compliance intention (MCI) in the first step (see column 1 of Table 3) and added two interaction terms SN x ALF and SC x ALF in the second step (see column 2 of Table 3). We present our results in Table 3. The results show that SN has a positive and significant effect on warning message compliance intention (b = 0.36, $p < 0.001$). The results further demonstrate that the effect of ALF on MCI is positive and significant (b = 0.30, $p < 0.001$). However, the effect of SC on MCI is not significant (b = -0.04, $p > 0.05$).

Regarding the tests for the moderation hypotheses, our results show that SN has a positive and significant impact on MCI (b = 0.77, $p < 0.001$), supporting H1. However, SC has no

significant effect on MCI (b = -0.14, p >0.05), hence we cannot confirm H2. The interaction effect SN x ALF is significant (b = -0.08, p < 0.05), supporting H3. In contrast, the interaction effect SC x ALF is not significant (b = 0.03, p > 0.05), we therefore cannot confirm H4. We also tested the control variables of gender, income and education on message compliance intention, but none of them is significant, which means our control variables do not affect the main effects. All the results for the interaction effects are shown in column 2 of Table 3.

3.6 Robustness test for moderating effect

Potential quadratic effects might lead to spurious moderation (Daryanto, 2019). Therefore we need to control for the quadratic terms to ensure that our moderation effect is not spurious (Daryanto and Lukas, 2022). We used the macro software ModLR developed by Ahmad Daryanto. We inserted three quadratic latent factors in our model with their respective items. We took three items from our latent factors (i.e., SN, ALF, SC) to create items for interaction and quadratic terms. To illustrate, if ALF is our item for anxiety over land and forest fire, then the square of the indicator (i.e., ALF^2) becomes an indicator of the latent factor of squared anxiety over land and forest fire. The results show that the interaction effect between anxiety over land and forest fire and perceived subjective norm is negative and significant (SN x ALF; b = -0.11, p < 0.01) (see column 3 of Table 3). However, the interaction effect between perceived source credibility and anxiety over land and forest fire is not significant. Analyzing the negative interaction effect, the results suggest that perceived subjective norm has an effect on message compliance intention when anxiety over land and forest fire is low. The results also show that the best plausible model is model 4 (see Table 4, model 4), as the D value is less than 2 (Burnham, 1998), which implies that there are no threats to quadratic effects and the interaction effect is not spurious.

Table 3. Results of SEM model (with and without quadratic effects control)

Dependent variable	MCI		
	Model 1	Model 2	Model 3
Main effects			
SN	.36***	.77***	.54*
ALF	.30***	.59***	.94**
SC	–.04	–.14	–.33
Interaction effects			
SN x ALF		–.08*	–.11*
SC x ALF		.03	.06
Control variables			
GEN	–.02	–.05	–.06
INC	.04	.01	.01
EDU	–.01	–.01	–.01
SN^2			.03
ALF^2			–.03
SC^2			.01
Number of observations	651	651	651

*p < .05, **p < .01, ***p < 0.001, MCI = Message Compliance Intention, SN = Perceived Subjective Norm, ALF = Anxiety over Land and Forest fire, SC = Perceived Source Credibility, GEN = Gender, INC = Income, EDU = Education

Table 4. Robustness check for moderation effect

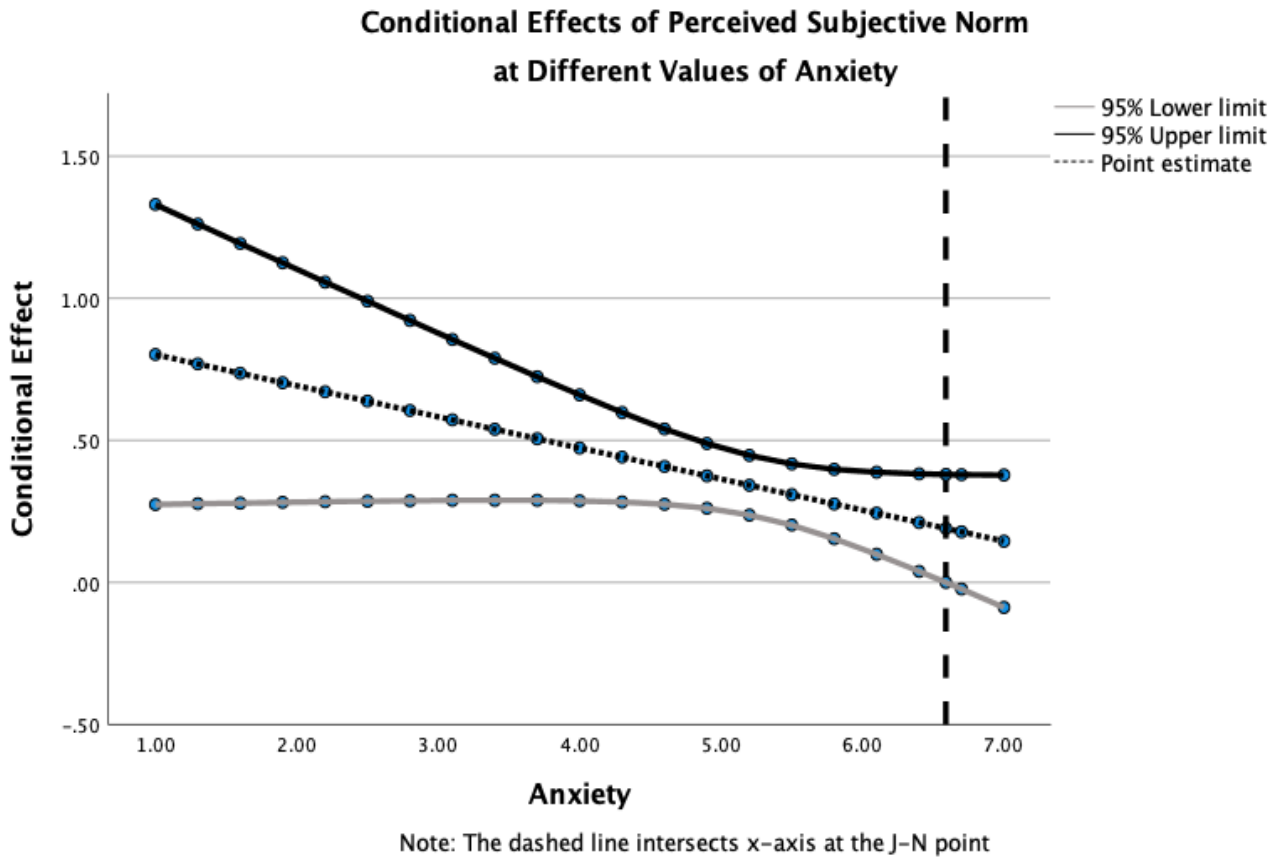
Models	K	RSS	AIC	D	Weight
1	9.000	350.163	1461.939	5.882	.017
2	4.000	388.972	1520.366	64.309	.000
3	4.000	403.092	1543.577	87.520	.000
4	10.000	345.949	1456.057	.000	.316
5	11.000	346.679	1459.431	3.373	.058
6	12.000	344.207	1456.771	.714	.221
7	13.000	344.092	1458.553	2.496	.091
8	13.000	342.838	1456.177	.120	.297

Recommendation: D ≤ 2

To confirm the results, we also conducted floodlight analysis using Johnson-Neyman with PROCESS model 1 (Hayes, 2017) to test the interaction between perceived subjective norm, perceived source credibility and anxiety over land and forest fire. We mean-centred the moderator and independent variables to ensure that the coefficient of the main effects can be inferred directly from the original variables as recommended by Dawson (2014). The results

were in line with the previous results. The results showed that the effect of perceived subjective norm on compliance is significant when anxiety level is below the threshold value of 6.7 (i.e., between agree and strongly agree on the 7-point scale (see Figure 2)). The relationship between perceived subjective norm and message compliance intention becomes weaker as the level of anxiety increases. With respect to the effect of perceived source credibility on message compliance intention, the results showed that the interaction effect between perceived source credibility and anxiety over land and forest fires was not significant.

Figure 2. Conditional effect of perceived subjective norm at different levels of anxiety



3.7 Post hoc

To gain additional insights, we also tested a competing model to account for the possibility that perceived source credibility might explain the relationship between perceived subjective norm and message compliance intention (i.e., as a mediator variable) (Xie et al., 2011). We present our competing model in Figure B.1 of Appendix B. We demonstrate the regression results of the competing model in Tables B.1, B.2, B.3 of Appendix B. The results showed that perceived source credibility cannot mediate the relationship between perceived subjective norm and message compliance intention. Comparing our main model (see Figure 1) and our competing model in Figure B.1 of Appendix B, we can conclude that perceived source credibility cannot be modelled as a mediator variable, thus our earlier findings regarding the main conceptual model are robust.

4 Discussions and implications

The purpose of our study is to examine the relationship between perceived subjective norm and perceived source credibility on warning message compliance intention in the context of land and forest fire disaster. We also propose anxiety over land and forest fire as the moderating variable. Our study found that perceived subjective norm as a proxy for government's normative vertical power positively influenced warning message compliance intention. This means that when the residents receive a government alert about the land and forest fire, they will likely oblige because of the normative expectation for them to follow government instructions. However, we found that perceived source credibility does not affect the residents' message compliance intention. In the presence of perceived subjective norm, source credibility does not seem to be an important predictor of message compliance intention. This particular finding is interesting as past research suggested that source credibility is one of the factors that affects message compliance intention (De Meulenaer et al., 2018; Mayhorn and McLaughlin,

2014). The reason for this difference in the findings could be that the 'source' that was referred to by past research is either an individual or a group that does not represent the central government; hence the perceived credibility of the 'source' affects the residents' individual judgments (Maathuis et al., 2004).

Another main finding from our research is that anxiety over land and forest fire moderates the effect of perceived subjective norm and warning message compliance. Our findings indicate that the relationship between perceived subjective norm and message compliance intention is strong if anxiety over land and forest fire is low. We found that high level of anxiety over land forest fire alone is sufficient to lead to compliance with the warning message. However, if the residents have low anxiety over land forest fire, perceived subjective norm could encourage them to comply with the warning message.

Our study makes the following contributions. First, our study replicates prior research on the relationship of perceived subjective norm, perceived source credibility, and message compliance in Indonesia with the perceived subjective norm as a proxy of government's normative vertical power and the 'source' in perceived source credibility refers to the government. We use Indonesia as our research context because Indonesia regularly experiences land and forest fire and it is a collectivist country where the residents are easily influenced by normative expectations (Trongmateerut and Sweeney, 2013). Indeed, we found that perceived subjective norm influences message compliance intention and, in its presence, perceived source credibility is not an important predictor of message compliance intention. Second, our study is one of the first to empirically demonstrate that a cognitive factor (i.e., perceived subjective norm) and an emotional factor (i.e., anxiety over land and forest fire) influence message compliance intention simultaneously. By examining the joint effects of cognitive and emotional factors, our study enriches the scant literature on the message compliance intention. Our study offers an understanding on how cognitive and emotional factors affect message

compliance intention at once. Third, our study adds to the current research on early warning and message compliance. We present the relationship between government and residents in the context of land and forest fire disaster by adapting Etzioni's compliance theory. As far as we are aware, our study is the first to empirically demonstrate the relationship between government-residents by using normative vertical power which was mapped to perceived subjective norm to examine the residents' normative perception on message compliance.

Our findings imply that the government could impose its normative vertical power to make the residents comply with the warning messages, for example by influencing public opinion on the normative expectation to follow government instructions. The government's campaigns on forest fire prevention and response can be used as 'leverage' in exerting the government's normative power. Some people with very high levels of anxiety over land and forest fire will comply with the warning messages regardless of their perceived subjective norm; but for most people, their perceived subjective norm is important to make them comply with warning messages from the government.

5 Limitations and further research

Our research has some limitations. First, as our samples were collected in Indonesia, the results could be influenced by the culture and other unique sample characteristics. Future research can replicate this study in other countries. Second, we only consider normative vertical power as a predictor for message compliance intention. We do not consider the other types of normative power i.e., the normative horizontal power from families, peers, or neighbors, which future research can explore. Third, besides anxiety, there are other emotions that future research can explore such as other negative emotions i.e., fear or sadness, and positive emotions i.e., joy and calm that may influence warning message compliance. Such research could potentially offer a further understanding on how emotional factors interact with cognitive factors to influence message compliance intention in a land and forest fire context.

6 Conclusion

Although message compliance intention has been widely discussed in the literature, how residents comply with warning messages communicated by the government regarding potential forest fire in their areas of residence has not been unexplored. In this research, we aim to fill this gap by introducing anxiety over land and forest fire as a moderator of the relationship between normative vertical power, perceived source credibility, and message compliance intention; hence, advancing the understanding on cognitive and emotional factors that affect message compliance intention. Our findings have important implications on the effectiveness of government early warning messages.

CHAPTER 5

CONCLUSION

An Integrated Perspective of Three Studies

This thesis covers three independent studies which are linked together to form a key research foundation to address the purpose of the study. In this section, we highlight several topics that incorporate these three studies, their findings for both theoretical and policy implications.

The Role of Anxiety over Land and Forest Fire

This thesis concentrates on the role of anxiety over land and forest fire in influencing residents' coping responses to mitigate the negative impacts of land and forest fire. Specifically, it examines residents' intention to purchase certified palm oil products and comply with warning messages. This thesis is broken down into three primary studies including scale development in Chapter 2, residents' purchase intention toward certified palm oil products in Chapter 3, and residents' compliance with government warning messages in Chapter 4.

In Chapter 2, we conducted a scale development study of anxiety over land and forest fire. In our scale development process, we included residents who live near the land and forest fire prone areas. We revealed that anxiety over land and forest fire is a two-dimensional scale i.e., concern for welfare and concern for wellness. Our study is the first study to measure a scale of anxiety over land and forest fire. Our newly developed scale could be used to assess residents' level of anxiety to mitigate the impact of land and forest fires disaster.

In Chapter 3, we focused on residents' intention to purchase certified palm oil products. Using our newly developed scale, we examined the relationship between anxiety over land and forest fire, environmental knowledge and purchase intention towards certified palm oil products. We demonstrated that anxiety over land and forest fire could influence purchase

intention towards certified palm oil products. We also found that environmental knowledge is positively significant in affecting purchase intention towards certified palm oil products. Using a different sample, we used attitude towards certified palm oil products as our mediation variable. The results showed that attitude towards certified palm oil products fully mediates the relationship between anxiety over land and forest fire and purchase intention towards certified palm oil products. Further, the results demonstrated that attitude towards certified palm oil products partially mediates the relationship between environmental knowledge and purchase intention towards certified palm oil products. These findings suggest that anxiety over land and forest fire as a negative emotion is found to influence and alter residents' behaviors to act in a responsible manner to mitigate the impact of land and forest fire disaster. The rationale is that if residents have anxiety over land and forest fire, they tend to participate in pro environmental behavior by purchasing certified palm oil products to protect the environment and reduce the effects of land and forest fire (Gao et al., 2021).

In Chapter 4, we concentrated on residents' compliance intention with warning messages. We also utilized our newly developed scale to explain the government–resident relationship on compliance on warning messages. To the best of our knowledge, we have not found any previous studies that discussed government–resident relationships by using normative vertical power to examine the residents' normative perception on message compliance. We examined the interaction effect of anxiety over land and forest fire (low vs high) which explains the relationship between normative vertical power and perceived source credibility on message compliance intention. We mapped normative vertical power as a perceived subjective norm. The results demonstrated that perceived subjective norms influence message compliance intention, whereas perceived source credibility has no effect on message compliance intention. With regard to the interaction effect, our findings showed that anxiety over land and forest fire moderates the relationship between perceived subjective norm and message compliance

intention. However, anxiety over land and forest fire do not moderate the relationship between perceived source credibility and message compliance intention. On the one hand, if residents have high levels of anxiety over land and forest fire, they are most likely to comply with the warning messages. This finding can be interpreted as demonstrating that anxiety over land and forest fire could promote residents' intentions to undertake a coping response behavior i.e., compliance with warning messages. On the other hand, if residents have low levels of anxiety over land and forest fire, the government could influence residents to comply with the warning messages by enforcing their normative vertical power over residents. Therefore, government normative power plays a major role in affecting residents' intention to comply with warning messages.

Finally, we can conclude that anxiety over land and forest fire is the link that unifies our three primary studies from Chapters 2 to 4. Anxiety as an emotional factor can be an effective approach to examine residents' coping responses in terms of land and forest fire disaster. It can affect and modify residents' behavior to respond in a favorable way to reduce the impacts of land and forest fire disaster. Our research could give contributions for companies on strategic decisions on certified palm oil products, and for government to set policies to support certified palm oil products and influence residents to follow government instructions.

Policy Implications

We can draw a number of policy implications to improve our understanding of the relationship between anxiety over land and forest fire and stakeholders. This section will briefly summarize the policy implications that have already been presented at the end of each chapter. First, in Chapter 2, researchers can use our newly developed scale to assess the anxiety of residents who are regularly exposed to fires. Evaluating residents' anxiety frequently is important to manage stressful conditions and behavior. With a better understanding of the residents' anxiety, the

government can implement prevention measures, such as by implementing an early warning to communicate to the residents about the potential land and forest fire and hence reduce the impact of land and forest fire disaster. For example, issuing warning messages may allow residents who have anxiety to develop a feeling of preparedness. Such residents may decide to take good preventive action (i.e., being ready to evacuate if they are being asked to), which could mitigate harm to residents' lives.

Second, in Chapter 3, one of our findings showed that residents are likely to support environmental behaviors to lessen their anxiety over land and forest fire by deciding to purchase certified palm oil products. These findings will benefit palm oil plantations, because implementing RSPO certification in all products related to palm oil will have the potential to reduce forest loss (Cattau et al., 2016), which in turn could decrease land and forest fire activity. For palm oil producers, assuming that companies follow the RSPO principles and criteria, this will enable the companies to demonstrate that they are protecting the environment and improving the sustainability of the forest. For example, palm oil companies can create a marketing campaign in their product labeling by stating that "our products do not cause land and forest fire". The companies might boost the demand for sustainable palm oil and may gain consumers' trust. As a result, more consumers are likely to decide to purchase certified palm oil products. For the government as a policy maker, this implies that they should raise awareness for residents to promote sustainable behaviors by persuading residents to purchase certified palm oil products to decrease the impact of land and forest fire. This could be done by actively informing residents through several means, for example a social campaign through several media such as television, social media or outdoor advertising (e.g., billboard), or the government can employ public relations strategies e.g., a press conference.

Third, in Chapter 4, the results showed that government can persuade and influence residents by imposing its normative vertical power to encourage residents' compliance with

warning messages. Government could create a social campaign on forest fire coping response strategies as a control on the government's normative power to manage residents' compliance. For example, government can begin with a public awareness campaign that explains how residents will receive emergency information and what procedures residents may take when there is a potential land and forest fire. The campaign may also contain information of the negative consequences of land and forest fire if residents decide to ignore the government's warning messages. Such a campaign would increase residents' understanding on the importance of compliance with warning messages. Government may also tailor the campaign for diverse residents using different platforms. For instance, for the younger generation, government can utilize a campaign using influencers via social media e.g., YouTube to educate and inform them about compliance on warning messages, as social media influencers may influence their behavior (De Veirman et al., 2019).

Avenues for Future Research

This final section presents a number of further directions for future research. First, in chapter 2, we presented the scale development procedures of anxiety over land and forest fire. Employing our newly developed scale is a promising step for further research and following our guidelines may provide consistent measurement across studies. Second, in chapter 3, our research highlighted the relationship between anxiety over land and forest fire, environmental knowledge, attitude towards certified palm oil products and purchase intention towards certified palm oil products. However, our research samples are only conducted in Sumatra and Kalimantan islands of Indonesia where the land and forest fire occurs. These samples may not be a nationally representative sample, hence our research cannot predict the general population and further research could address this limitation by investigating different populations of people who suffer from the impact of land and forest fire across Indonesia. Future research

could investigate the relationship between anxiety over land and forest fire with purchase intention towards certified palm oil products as the populations are located further away from the land and forest fire locations. The actual and perceived spatial distance from the land and forest fire location may affect this relationship.

Third, in Chapter 4, the results showed that for residents who have low anxiety, only normative vertical power from the government can push them to comply with warning messages. Otherwise, they will not comply with the government warning messages. As mentioned in McLennan et al. (2019), drivers in non-compliance behavior are important in relation to residents' compliance decisions. However, to discuss the drivers is beyond the scope of this thesis because our focus is on residents' intention to comply with warning messages. Future researchers could investigate the drivers behind these non-compliance behaviors for residents who have low anxiety levels. Additionally, in this chapter, we did not measure the extreme form of anxiety that residents might experience (e.g., panic attack). When a disaster happens, many people will get panicked. The panic attack is the result of re-experiencing the traumatic events with the feeling of fear and helplessness in thoughts (Sood, 2020). Past research found that panic attacks lead to an avoidance behavior (Salkovskis et al., 1999). Some residents who re-experience the land and forest fire disaster may be likely to get panic attacks and they will behave in a way that is intended to avoid or escape the disaster situation at the time of a panic attack. Future research could examine residents who have panic attacks and how panic attacks affect residents' intention to comply with warning messages. Furthermore, research on message compliance (Han et al., 2015) demonstrated that past experience may influence message compliance in an emergency context. In Chapter 4, we used consumers' demographic variables i.e., gender, income, education and age as control variables. Past experience of disasters might influence people in terms of assessing the intensity of disaster and will affect compliance. Therefore, we recommend that further research should take past

experience of land and forest fires disaster as a control variable as it may influence residents' intention to comply with land and forest fire disaster warning messages.

This thesis focuses on residents' coping responses in mitigating the impact of disasters. However, we only measured the behavioral intention, we did not measure the actual decision. Future research could be conducted to measure actual decision because the actual decision is important to improve the efficiency of disaster response and preparedness (Horita et al., 2018). Finally, this thesis presents a novel perspective on an emotional factor in terms of residents' coping responses in the context of land and forest fire disaster. We hope that this thesis has contributed to more insights on the effect of anxiety over land and forest fire and its role in influencing residents' coping responses. Such insights could be used for future studies to enrich the body of knowledge on anxiety and disaster research.

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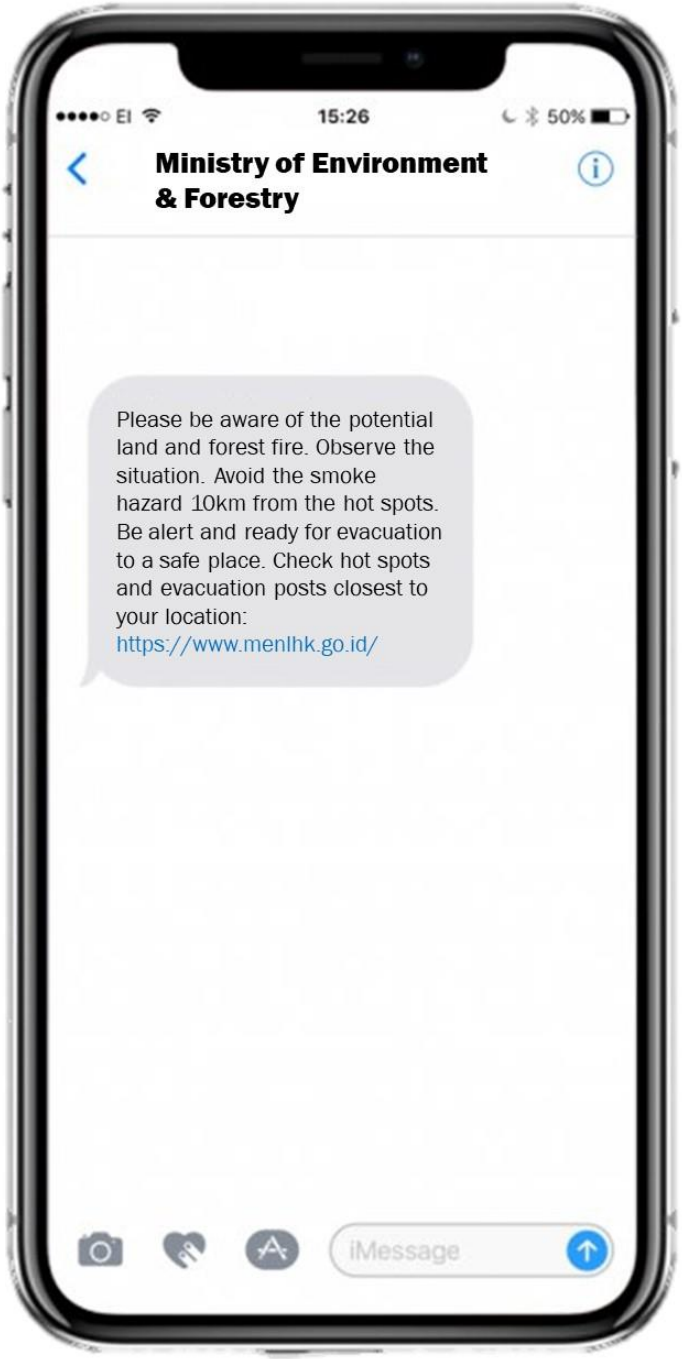
Appendix A of Chapter 4

Figure A.1



Appendix B of Chapter 4

Figure B.1 A competing model

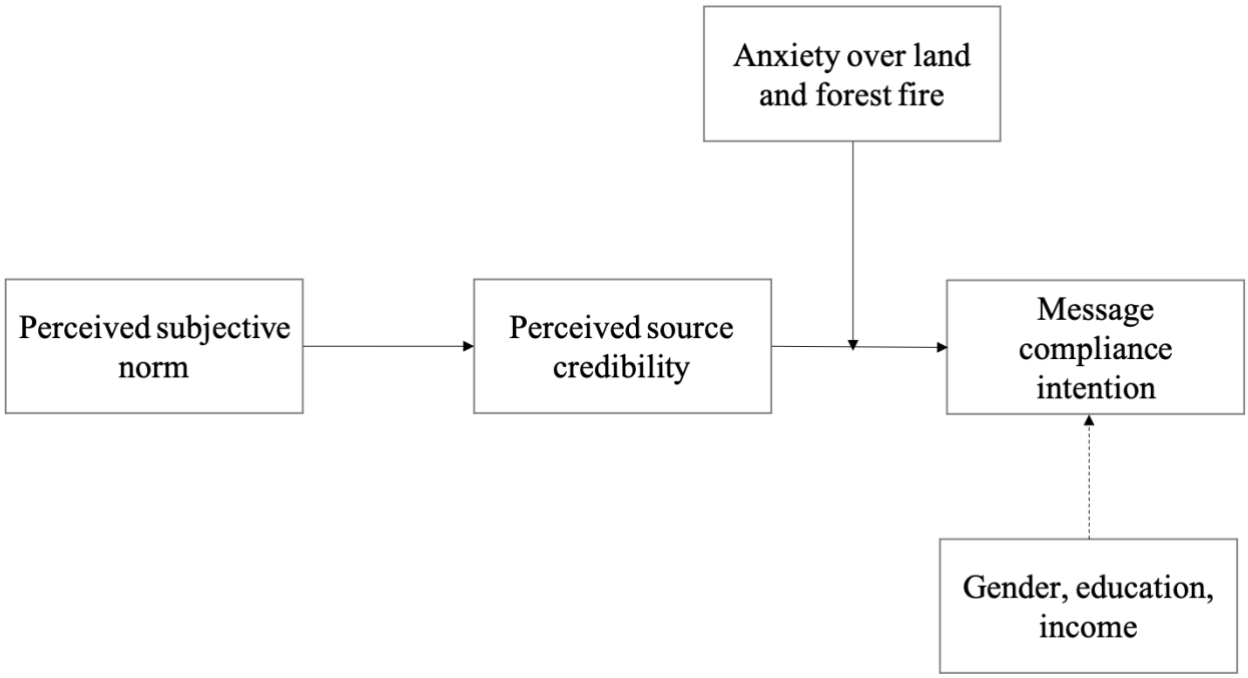


Table B.1 Regression Results

	b	SE	t	P	LL	UL
SN	.341	.667	6.482	.0000	.238	.445
SC	.222	.052	1.533	.1257	-.062	.507
ALF	.486	.145	3.494	.0005	.212	.759
SC x ALF	-.033	.139	-1.286	.1988	-.085	.017
GEN	-.055	.026	-.996	.3195	-.164	.053
EDU	-.017	0.555	-.415	.6777	-.101	.066
INC	.008	.030	.279	.7800	-.050	.067

Note: SN= Perceived Subjective norm, SC= Perceived Source Credibility, ALF= Anxiety over Land and Forest Fire, SC x ALF= Interaction Effect, GEN= Gender, EDU= Education, INC= Income, Bootstrap=5000

Table B.2 Results of indirect effect

ALF	Effect	SE	LLCI	ULCI
4.576	.045	.036	-.023	.122
5.441	.025	.035	-.041	.101
6.304	.006	.041	-.070	.094

Note: ALF= Anxiety over Land and Forest Fire, Bootstrap= 5000

Table B.3 Results of moderated mediation

	Index	SE	LLCI	ULCI
ALF	-.022	.017	-.054	.016

Note: ALF= Anxiety over Land and Forest Fire, Bootstrap= 5000